

# The Iron Age

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A Review of the Hardware, Iron and Metal Trades.

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## Improving Water-Powers.

The drainage from given areas has been referred to as a quantity that can be determined very nearly. For the purpose of doing this two factors must be taken into the account, the annual rainfall and the proportion of this that is lost to the streams by evaporation. Mr. Wells, in "Water-Power of Maine," estimates the rainfall in that State, which includes the depth of the water produced by the melted snow at 42 inches. In regard to the evaporation he says: "What proportion of the total annual rainfall is wasted by the atmosphere may be ascertained either by direct observation upon evaporation or measurement of the discharge of streams. In either case the experiments require to be conducted with care throughout the year, and, indeed, for a series of years. By neither of these methods has the yearly sum of the evaporation in our State been determined, and of the data needed for the determination only a few elements, as the minimum and maximum delivery of a few of the rivers, are at command. The percentage of actual water waste can, however, be arrived at with tolerable accuracy by reference to the statistics of evaporation in other districts, with suitable allowance for the difference of latitude, temperature, winds, ocean exposure, &c.

After examining the returns from various districts where the proportion of evaporation to rainfall had been determined, and finding it from 50 per cent, at the Schuylkill Naval Reservoir, and 55 per cent at the Long Pond, Boston, Water Works, to 67 per cent in England and Ireland, 75 per cent upon the Mississippi River basin, and 85 per cent upon the basin of the Missouri River, he concludes that on the whole it would seem safe to assign as a figure very closely approximating the actual annual evaporation 60 per cent. of the yearly downfall. In other words, of the 42 inches of received yearly, 25.2 inches are absorbed by the atmosphere and 16.8 inches pass off by the rivers to the sea. In this connection the common misapprehension that is frequently exhibited in regard to the capabilities of such reservoirs for retaining water may be mentioned. Many people are hardly ready to entertain the idea that six months are required for an opening capable of passing 8 cubic feet per second to draw the water from a reservoir containing 127,000,000 cubic feet. The remark is frequently heard in regard to such a reservoir that it must be fed by springs to enable it to hold out so long, when in reality the ratio of the water delivered was in proportion to the whole volume somewhat less than the proportion given, the difference being necessary to account for the loss by evaporation during the dry and hot weather in the summer. When it is recollected that the loss of moisture by evaporation from large districts of country in this latitude is estimated at fully 25 inches each year, the necessity for making such allowance will be appreciated. Besides this, the loss from the surface of lakes or ponds must be greater on account of the exposure than from the dry ground. The rivers of vapor lifted from the ocean and conveyed landward by the atmosphere, to be condensed there and form the water supply that is drained by the streams and rivers from the highland to the sea, and furnish the power in its descent for driving mills, may be mentioned as evidence of this.

One thing has been omitted in giving directions for building these dams of stone and wood upon small streams, particularly where the water is drawn from a reservoir about to supply power in the dry seasons, and that is to exhibit the necessity of making provision for drawing it off to the bottom of the pond whenever there is occasion to do so for convenience in making repairs. In many of these dams the wall was laid across the stream to the height of the bottom of the flumes, using the largest and best stones for the faces on each side and filling the center with smaller ones or such as were not suitable for laying on the outside, packing them well. Judging from the appearance, the impression prevailed at the time that the water would pass off freely through the spaces between the stones whenever the planking was removed for the purpose of renewing it, but when subjected to the test of actual trial it will not, and the

only alternative is to do the work with the water standing several feet in depth, or take down the wall for the purpose of drawing it off. In pursuing the latter course a growth of the lower forms of vegetation is found among the rocks that has partially filled the spaces between them. With a little sediment added, nature completes its work, and has formed a tight dam that grows higher gradually among them. The remedy is to have an open passage through the dam in the lowest place large enough to carry off the water that usually runs at the time repairs are made. This matter obviously deserves

pulley has an extra thick rim and an elongated and enlarged hub. The inner part of the rim between the pulley-arms and the edge next to the mill is turned true together with the corresponding part of the hub. Between the rim and the hub is placed the paper friction pulley D, as shown in Fig. 2 and in the diagram on page 7. The shaft of this pulley runs in movable boxes and may be moved back and forth by means of an eccentric underneath the box next to the pulley and connected with the rod O, which in turn is connected with a lever operated by the sawyer. Power is transmitted from

the malleable-iron feed-chain from one set of sprocket-wheel to the other, either larger or smaller, as the case may require. The chain is kept taut by means of the lightning pulley G, worked by the lever H. With double mills a pulley, E, is furnished for running the top saw; M is the wedge-wheel or splitter; I is the saw guide and K is the log slide. The carriage and set rig are shown in the perspective view. The set rig is of the double-acting type, setting the knees forward at each movement of the set lever. It can be adjusted by the sawyer to set from  $\frac{1}{4}$  to 1 inch at each throw of the

## History and Aims of the Brotherhood of Locomotive Engineers.

A concise and instructive review of one of the most powerful and best conducted labor organizations in the country was the feature of the Congressional Club meeting at Cleveland. Mr. F. M. Arthur was the speaker, and the Grand International Brotherhood of Locomotive Engineers, of which he is the chief, formed the theme of his address. He stated in opening that he had prepared no set speech, but would give a plain statement of the progress of the organization, and the plan on which it was conducted. Twenty-five years ago the locomotive engineers were organized and were looked down upon by the public for the reason that in too many cases there was on their part a lack of self-respect. It should not be understood, however, that the brotherhood is formed altogether of reformed drunkards, for 25 years ago there were many noble exceptions to the general rule. They were regarded with distrust, and from the fact that many yielded to the temptation afforded by the nature of their occupation they found many defamers. Early in the sixties a few men on the Michigan Central Railroad conceived the idea of forming an association, and five of the number held a meeting at Marshall, Mich., for the purpose of considering the question. This was followed by an invitation to the employees of adjoining roads, and they held a meeting at Detroit. A constitution and by-laws were adopted and Detroit Division No. 1, Brotherhood of the Footboard, was organized. Sobriety, truth, justice and morality formed the basis of the order, and their motto was, "Do unto others as you would have them do unto you, and thus fulfill the law." To the fulfillment of these principles much of the success of the organization is ascribed. Twelve divisions were formed, and the present name was adopted at a convention held in Indianapolis August 17, 1864. When first organized the brotherhood was looked upon with suspicion, strikes and dictation to employees being supposed to be its object. It now includes 320 subdivisions, and nine-tenths of the best engineers on the continent. A monthly magazine devoted to the interests of engineers, the first number of which was issued in 1867, now has a circulation of 19,000 copies, and is sent to all parts of the world. One of the features of the publication is the names of all expelled or suspended members. Some objections were urged against it, but it has been found that fear of exposure has had the effect of preventing wrongdoing.

On December 3, 1867, an insurance association was formed within the brotherhood on the mutual assessment plan. It has paid to the heirs of deceased members \$1,852,000, and has disbursed to the needy and distressed over \$500,000. The organization has reformed many a man, and its whole object is elevating. To become a member a man must have one year's experience as an engineer, be of good moral character, temperate habits and able to read and write. Political or religious discussions are not permitted in any of the divisions, but every influence is brought to bear to induce a man to lead an upright life. Mr. Arthur stated that he would say in all candor that they were not ashamed of their strikes, and under like circumstances would strike again. All efforts are exhausted to secure a peaceful settlement and are usually successful. In every instance where a railroad manager has refused to confer with a grievance committee a strike has resulted and the men gained their end. Three strikes were

caused by the discharge of men without cause. In 1876 a new manager of a Canadian railroad discharged men who had been employed by the company from 20 to 30 years. He did it without provocation and on the supposition that he would rid the road of "the committee." The matter was investigated, the men found to have been wronged, and a committee asked that they be reinstated. The committee was treated with contempt, but found opportunity to inform the manager that unless he acceded to their requests every engineer on the road would go out at 9 o'clock the following Friday night. He laughed at the idea. They deserted their engines promptly on time. After three days the haughty railroad manager, in dismay, asked for a conference, and

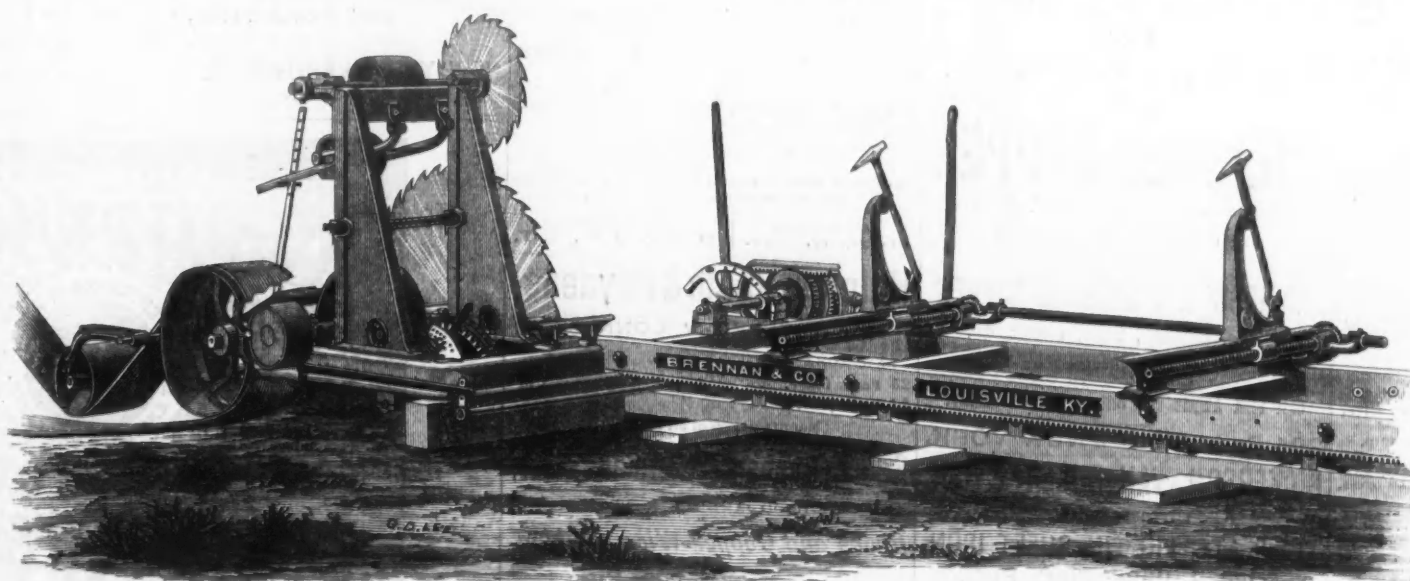


Fig. 1.—Perspective View.

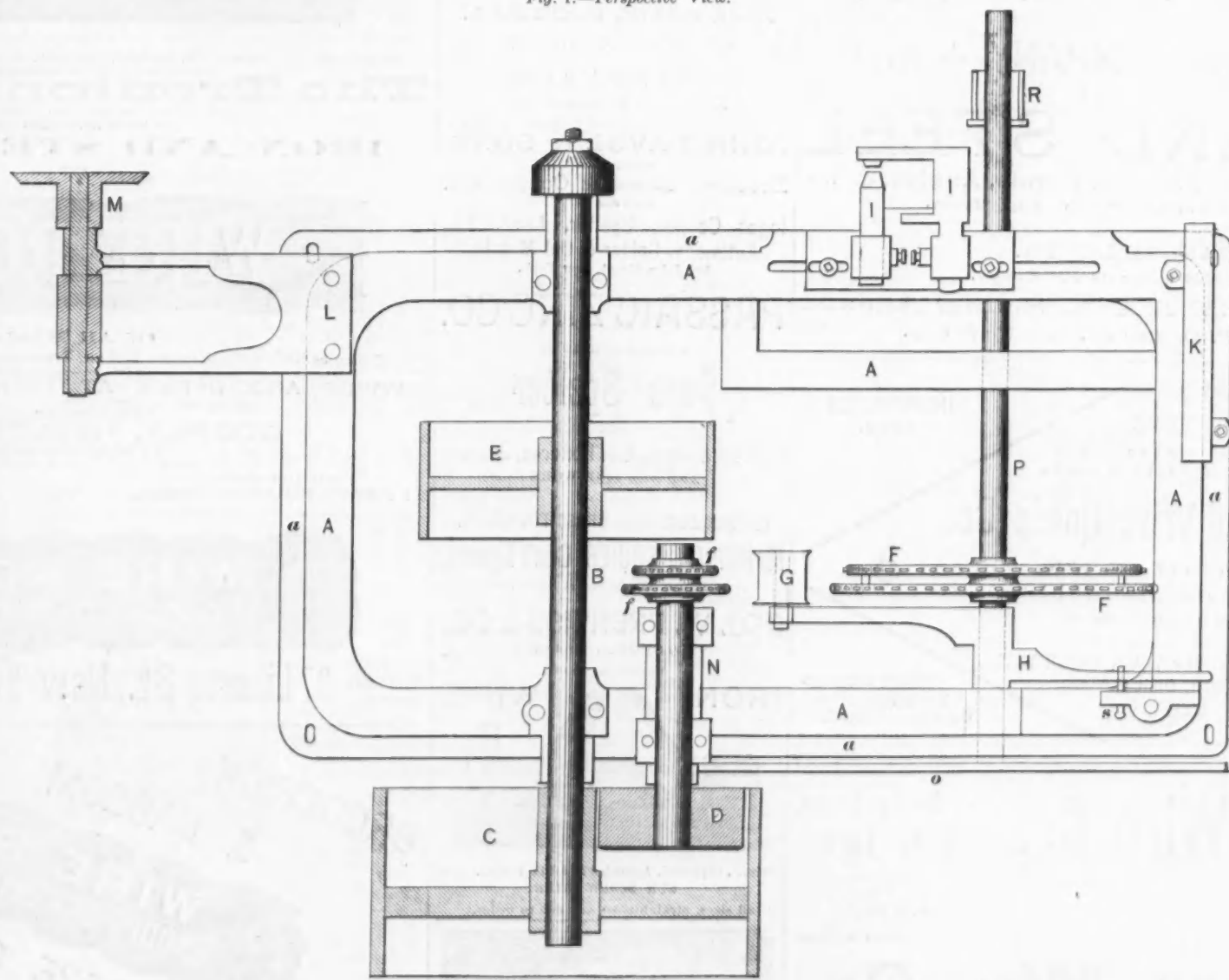


Fig. 2.—Plan of Power Transmitting Mechanism.

NEW CIRCULAR SAWMILL, BUILT BY BRENNAN & CO., LOUISVILLE, KY.

attention, and if duly considered in building a dam much unnecessary trouble will be avoided in subsequent operations.

## A New Circular Sawmill.

Our engravings on this page represent a new circular sawmill just built by Messrs. Brennan & Co., of Louisville, Ky. It is novel in many respects, and as it is probably one of the simplest and most compact mills of its capacity now on the market an examination of its more important features will prove of some interest. The frame A (Fig. 2) is made of cast iron, in one piece, and is well proportioned. Opposite the saw collar on the mandrel B is the driving pulley C. This

the pulley C to the pulley D and to the small sprocket-wheels f f mounted on the same shaft. From these the power is taken by the larger sprocket-wheels F F by means of a malleable-iron chain and finally by means of the shaft P to the pinion R. This works in the rack underneath the saw-carriage. By pressing the lever connected with the rod O in one direction the friction pulley D is brought to bear against the hub of the pulley C, and the carriage is accordingly fed toward the saw. By reversing the pressure on the lever the pulley D ceases to bear against the hub of the pulley C and is pressed against the rim. The motion of the saw-carriage is thus naturally reversed also, and the carriage travels back rapidly. Different speeds are obtained by shifting

lever, increasing or diminishing the set by thirty-seconds or sixteenths of an inch at each throw, if desired. The setting blocks are of wrought iron. The mills will carry saws up to 58 inches in diameter, with a 24-inch top saw on the double mills. The carriage is 24 feet long on the rack side, and 22 feet on the short side.

Among the papers just issued by the secretary of the American Institute of Mining Engineers is one by Arthur F. Wendt, New York City, illustrating and describing a sectional hanging pipe hot-blast oven designed by him for the Spiegel furnace of the Lehigh Zinc and Iron Co., at Bethlehem, Pa.



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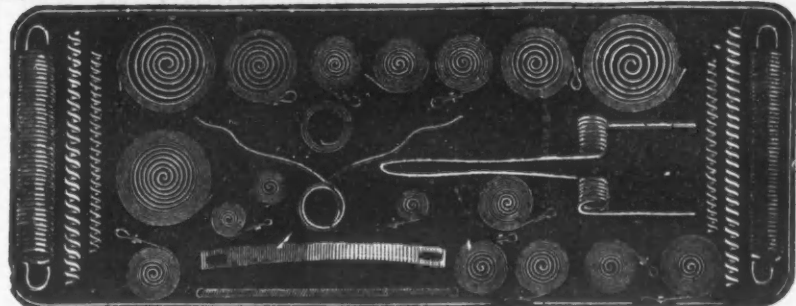
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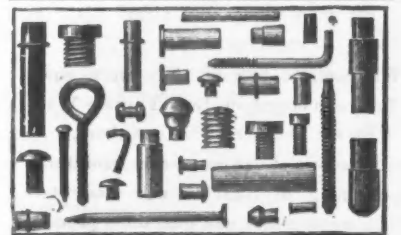
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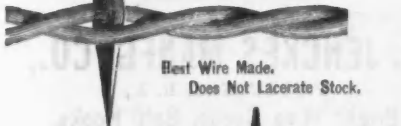
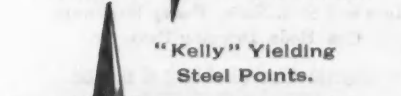
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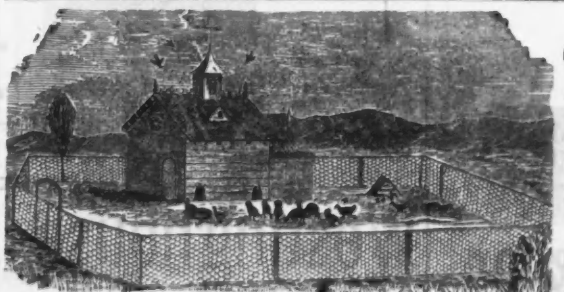
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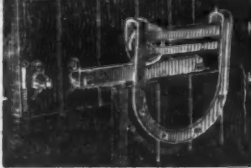
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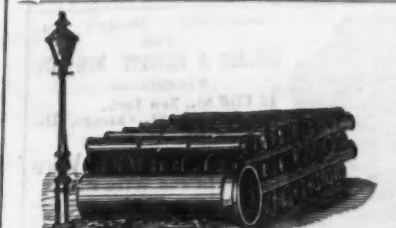
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the matter was satisfactorily adjusted. "We hold that we were not wrong," said Mr. Arthur. "We have never resorted to violence or intimidation. It is our principle that we cannot interfere with others who may want to work. But we say that if we are dissatisfied it is our privilege to quit work at will. It was the same on the Boston and Maine Philadelphia and Reading roads. Since then every question has been satisfactorily adjusted. It has been demonstrated within the past six months that a thorough organization is of importance to the employer as well as to the employee. If this had not been so, in the excitement in the Southwest not a competent man would have been left to operate an engine. Great pressure was brought to bear to induce us to join the strike, but so long as the railroad company fulfilled their contract with us I advised the engineers to adhere to their principles. They remained loyal to the end. It is not necessary to laud the brotherhood, for a tree is known by its fruit and a man by his work."

## English Letter.

(From Our Regular Correspondent.)

LONDON, June 21, 1886.

### THE SITUATION

and the general outlook have in reality undergone but little alteration during the week which has elapsed since I last wrote. The greater part of the interval has been taken up by the customary Whitsuntide holidays, which stopped all work throughout the entire country on the Monday and on Tuesday in all the manufacturing districts. In thousands of instances no recommencement was made before Thursday, and in hundreds the whole of the week was gladly given up to idleness. I say "gladly," because the works at which this policy was adopted were short of orders, and their owners were glad of the holiday excuse to stop production. Many of them would have been only too pleased to cease work for another week, but out of consideration for their workpeople, and perhaps by reason of isolated pressing orders, they have restarted to-day. Prior to the holidays an impression had got abroad that there was a slight improvement in the state of trade, and people were counting upon its continuance. Then came the untoward political crisis, the defeat of the Ministry, and now the appeal to the constituencies. Fortunately the election fever is likely to be short, even if sharp. The writs are ready for being issued, and we hope to have the elections concluded by about the end of July. Meantime the newspapers are full of political controversy, and the elections are being appealed to by partisans of each of the four parties who seek their suffrages in a most frantic and incessant manner. What the issue will be cannot be foretold at present, but whatever it is one cannot avoid expressing the hope that the winners may have a most decisive victory, so that they may be able to defy the Parnellites and remain in power for at least four or five years. Electioneering upsets business; consequently, all sober-minded business men hold in the utmost abhorrence elections and all their accompanying nuisances.

What with one thing or another, my report on the iron market this week is short, as you will see, for there has been but little worthy of being noted. There is still some talk of restricting the output of pig iron in Scotland and Cleveland, but nothing has transpired which leads me to anticipate that the scheme will be successfully carried through. I cannot very well mention names in this connection, but I know that in Scotland, at all events, two or three large firms will not take part in any general effort to restrict, but will "gang their ain gait," and do exactly that which best suits their own hands.

As regards the steel-rail men, I have information which leads me to suspect that some of them are growing amazingly uncomfortable under the current selling prices. At about £3. 10/ or from that to £3. 15/ 3/ ton there is said to be nothing in the way of profit that is worth fighting for, albeit two or three of the larger concerns appear to have made up their minds that the Germans must bid very low indeed if they mean to get any new business from the neutral markets. The Germans are hiding their time, and say they are not not by any means unwilling to let the Britishers lose a fair amount of money before the real struggle begins, at which juncture the Teutons allege that they will be found to be on hand and lively. The situation is somewhat complicated by the circumstance that several of the home and other railways are endeavoring to buy for three or four years ahead at about the present prices, their impression being that these low values are scarcely likely to last long. Their action is justifying their inference, inasmuch as their inquiries have induced the rail men to quote rather higher figures already, and if any orders should be placed it is not unlikely that we shall see £4 quoted, and perhaps passed, for home orders within the next few weeks. For export the case may be very different, for obvious reasons.

### THE IRON MARKET

last week, despite the holidays, occupied a position slightly in advance of that which has lately ruled, but the change has been more manifest in Scotland than elsewhere. Buyers are disposed to place their orders for further forward delivery than they were a week or two ago, but holders are not anxious to take long contracts either for large or small lots. Shipments from the Clyde, though below a general average, are rather better than they were expected to be, although no material difference is noted as to the amount of iron which is being placed in store. The warrant market has slightly advanced, and closed at 38/9. In Cleveland there has also been a slightly better tone, and 30/ have been asked for No. 3 G. M. B. Sellers, too, are more disinclined than before for forward delivery, and express themselves confident that better prices are near at hand. Shipments are now fairly good from Middlesboro', but the amount of iron in store is about the same as



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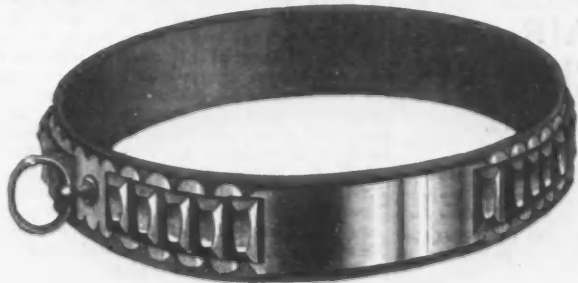


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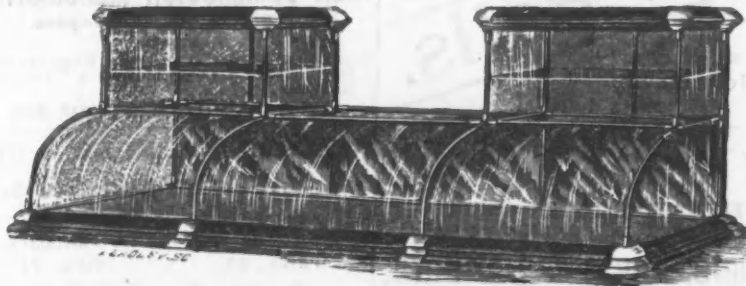
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 ent bell-metal joints a specialty, and the best in the world. Branch stores, 46 West Broadway, New  
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INDESTRUCTIBLE

## Furnace Lamp,

MADE BY

**TAYLOR & BOGGIS**

FDY. CO.,

Cleveland, - Ohio.

2 Sizes - 3 Pint and 2 Pint.

It has no Seams or Solder in  
 Its Construction.



LARGE HEADS. CHAMPION CITY HEADS.



## Horse Nails

Manufactured from very best  
 SWEDISH METAL. Will not split.  
 Are accurately pointed, tough, strong  
 and hold the shoe. Soft enough to  
 clinch readily; stiff enough to drive  
 without bending. All nails uniform  
 and perfect. They are used in thou-  
 sands of shops with the best of satis-  
 faction, and are especially liked by  
 "floor-men" for their good, reliable  
 driving.  
 Made in two patterns, "LARGE  
 HEADS" and "CITY HEADS."

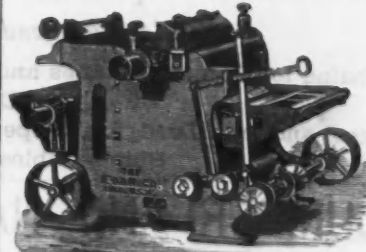
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LIST:

Nos. 4 5 6 7 8 9 10  
 50c. 25c. 25c. 25c. 22c. 21c. 20c.

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WOOD WORKING MACHINERY



36-INCH DOUBLE CYLINDER ENDLESS  
 BED SURFACER.

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 General Wood Workers.

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Fig Iron, Bar Iron, Bar Steel, Steel Blooms, Steel Billets,  
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## BOILER TUBES.

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Cotton Presses, Forgings, Rolling  
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We Challenge the World to Produce its Equal.  
 Sample sent postpaid on receipt of price.



PRICE, \$6.  
 Nickel Plated and  
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Top-Snap Action, Pistol Grip, Rebounding Lock, Patent  
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Hand Cuffs. PRICES:  
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Pumps.

Hydraulic Rams, Iron

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CYLINDERS

of every description,

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HYDRAULIC MACHINERY.

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Works at Tyrone Forges, Blair Co., Penn.,

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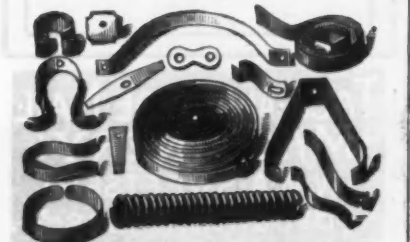
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ers' Tools, and Feed Cut-  
ters.Write for Catalogue and Prices.  
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GENERAL WESTERN AGENTS.European Agency with SELIG, SONNENTHAL & CO.,  
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CAGES.**The cheapest and  
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market. Catalogues and  
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Manufacturers of**Clock Springs and Small Springs**  
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**BRISTOL, CONN.****FIELD'S**  
IMPROVED**FORCE PUMPS.**Latest, Cheapest  
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Garden Engine.

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Goods delivered to points  
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The most durable and convenient.  
Send for Samples to the Manu-  
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The Oldest and Most Extensive Manufacturers of

**Pumps, Hydraulic Rams, Garden Engines,**Yard Hydrants, Street Washers, Galvanized Pump Chain, Wind Mill Pumps  
and Other Hydraulic Machines in the World.

Fig. 120.



Fig. 365.

Fig. 200.



Fig. 70.

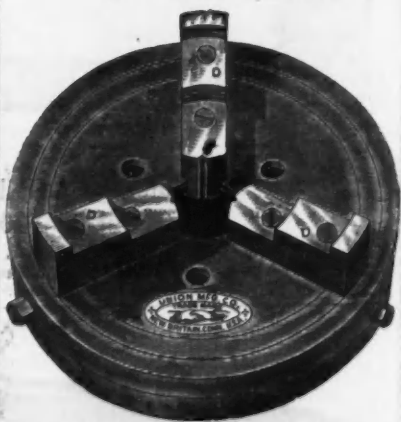
**"THE AQUANETTE,"**shown in the illustration, is a new article  
we are introducing, designed for shower-  
ing trees, shrubs, &c., as an insecticide,  
intended to carry in the hand, with pail on  
the arm. It will throw a good stream 40  
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Sent by Express, C.O.D., \$6.00.

LIBERAL DISCOUNT TO THE TRADE.

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SOLE MANUFACTURERS OF**Skinner's Patent Combination Chuck.**  
UNIVERSAL, INDEPENDENT AND ECCENTRIC.By sliding a stud on the back of chuck it  
is instantly changed from Universal to In-  
dependent, and vice versa. Each Chuck is  
guaranteed perfect. All parts are made  
interchangeable. Only the very best ma-  
terials used in their construction. Reverse  
or special jaws furnished when desired.

We also manufacture

Plain and Ornamental Butts,  
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Patent Copper Pumps,  
Hydraulic Rams, Power Pumps,  
&c., &c., &c.

Write us for prices.

**UNION MANUFACTURING CO. New Britain, Conn.**

WAREHOUSES, 103 Chambers Street, New York.

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**THE E. & G. BROOKE IRON CO.,**  
BIRDSBORO, BERKS CO., PA.,

MANUFACTURERS OF

**ANCHOR NAILS AND SPIKES. BRAND**

Capacity, 1000 Kegs per Day.

Made from their own Pig Iron, Insuring Regularity and Superiority in Quality.

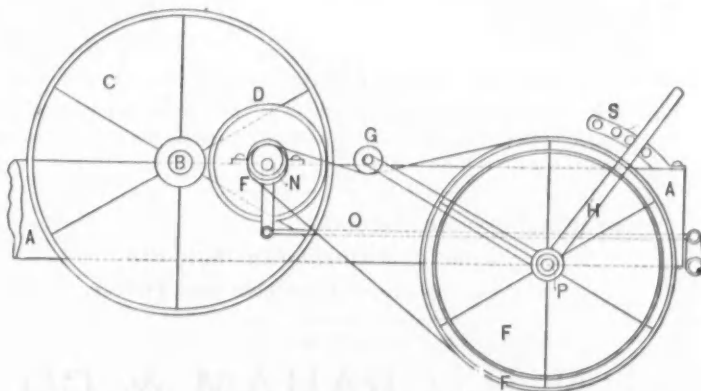
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**FOUNDRY AND FORGE PIG IRON,  
AND COLD BLAST CHARCOAL CAR WHEEL IRON.****OLD DOMINION****CUT NAILS, BAR IRON.****R. E. BLANKENSHIP, President,****RICHMOND, VA.****IRON AND STEEL DROP FORGINGS**All shapes, small and large, including  
GUN, PISTOL, WRENCH BARS, &c. ALSO, DIE SINKING, MANUFACTURERS ALSO  
OF BRICKLAYERS', MOULDERS' AND PLASTERERS' TOOLS,  
SADDLERS' BOUND AND HEAD KNIVES.**WILLIAM ROSE & BROS.,**

36th &amp; Filbert Sts., WEST PHILADELPHIA.

**NATIONAL HARDWARE & MALLEABLE IRON WORKS,**

Laligh Avenue, American and Third Streets, Philadelphia.

**THOMAS DEVLIN & CO.,****MALLEABLE, FINE GRAY IRON AND STEEL CASTINGS** made from patterns to  
order. Special attention given to Tinning, Bronzing, Coppering, Japanning and Fitting. A large line  
of Carriage and Wagon Castings constantly on hand for the trade.**C. F. RICHARDSON, ATHOL, MASS., Manufacturer of  
IRON LEVELS.**before. Although 30/ is quoted, there are  
lots to be obtained at a lower figure from  
intermediate holders who are under the  
necessity of selling, and it is not likely that  
better prices than those now quoted will rule  
until the stocks held by those who feel the  
pinch of depression are cleared off. This  
latter remark can also be applied to the West  
Coast, where, although inquiries are nume-  
rous and shipments are fairly good, yet sales  
are being effected at rates below 42/ for  
mixed lots. In Staffordshire no material  
change is to be reported; neither can any-  
thing new be mentioned as to galvanized  
sheets or wire. In the manufactured de-  
partments there has been no advance, and  
makers are uneasy as to what is to  
follow the work at present in hand. Old  
scrap still continues dull, but late rates pre-  
vail, as the market is but poorly supplied.Freights for pig iron from Glasgow to  
New York by ordinary steamer remain at  
5/. Steel remains as of late, makers being  
employed tolerably well, although all of  
them would welcome further orders not only  
to occupy a larger part of their works, but  
also to keep their places going upon the  
completion of orders now in hand. Steel  
sleepers are still quiet. Steel rails are a  
little stronger, and in view of an early rise  
from £3. 12/6, as now quoted, several Welsh  
makers have refused £3. 15/ for flanged  
rails, asking from £3. 17/6 to £4, according  
to the section. Rumor has it that some  
large orders are contemplated for railway  
development in the antipodes. New Zealand  
is mentioned in some quarters as the scenechiefly on Bessemer and Siemens steel plates  
with coke tinning, and some fair lines of  
coke tin were in request as well. Some  
makers have put up prices because of the  
advance in tin, while others have not, and  
the latter therefore secure the bulk of the  
business. Quotations have been advanced  
generally, and coke tins are now quoted  
firmly at 13/6 @ 14/ IC, and Bessemer steels  
ditto, also Siemens steel plates 14/3 @ 14/6  
IC. The demand for charcoal tins and  
ternes is still quiet, and it is hardly any use  
expecting any advance in the prices. There  
is no change from last week's prices. Coke  
tin and Bessemer steel coke wasters are in  
good demand at 12/3 @ 12/9.**THE HARDWARE TRADES.**In London the Whitantide holidays have  
largely interfered with business, a consid-  
erable number of London agents availing  
themselves of the opportunity of visiting  
headquarters in the provinces and compar-  
ing notes on the transactions during the  
current quarter. To all intents and purposes  
we are entering upon the dead season in the  
metropolis, and that combined with politics  
cannot fail to affect business. At Birming-  
ham the disturbing influence of the holidays  
upon trade is not relieved by the commence-  
ment of the stock-taking period, which  
necessitates a temporary suspension of de-  
liveries to many merchants and factors.  
Railway orders for lamps, carriage fittings,  
tubes, &c., have been arriving more freely  
during the past few weeks, but in other re-  
spects home orders are reported very slack

New Circular Sawmill.—Fig. 3.—Diagram of Friction Pulley, Chain Tightener, &amp;c.

(For description see 1st page.)

of action, while in others it is believed to be  
Western Australia, but whichever colony it  
may be it is stated that sufficient progress  
has been made to enable the promoters to  
approach one or two firms as to a portion of  
a first installment of 80,000 tons of steel  
rails and 120,000 tons of steel sleepers, this  
latter being by far the largest order ever  
specified.**SCOTCH PIG IRON**is a shade better, but that is about the best  
I can say for it, seeing that the shipments  
are still far in arrears, and the reserve  
stocks are still being added to on a very  
large scale. While these conditions hold  
good a furnace or two at work more or  
less does not seem likely to greatly affect  
the course of the market. There are now  
85 furnaces at work in Scotland, against 91  
a year ago. In Connal's stores there are  
776,214 tons (an addition of 2552 tons last  
week), as against 599,348 tons this date in  
1885. Shipments are 35,771 tons behind this  
year, while the imports of Middlesboro'  
pig iron into Scotland are 24,855 tons behind-  
hand. Current prices:

Deliverable alongside.	No. 1.	No. 2.
Gartsherrie, at Glasgow.....	42/	41/
Coltness, ".....	47/	43/
Langloan, ".....	45/6	41/6
Summerlee, ".....	47/	41/
Calder, ".....	46/6	41/
Carnbroe, ".....	42/6	39/6
Clyde, ".....	42/6	39/6
Montland, ".....	39/6	35/
Quarter, ".....	39/6	35/6
Govan, at Broomfield.....	39/6	35/
Shotts, at Leith.....	44/	45/
Carroll, at Grangemouth.....	47/6	44/6
Kinnell, at Boness.....	45/6	42/6
Glengarnock, at Ardrossan.....	43/	40/
Eglinton, ".....	39/6	35/6
Dalmellington, ".....	40/6	38/

**MIDDLESBORO' PIG IRON**is dull at about 29/6 @ 29/9 for No. 3, and  
G. M. B. sorts are quoted as under, f.o.b. at  
makers' wharves in the Tees:

No. 1 Foundry.....	32/3	Mottled .....	28/3
" 2 ".....	31/3	White .....	27/9
" 3 ".....	29/6 @ 29/9	Refined metal .....	46/6
" 4 ".....	29/3	Kentledge .....	33/6
" 4 Forge.....	28/9	Cinder .....	30/

**HEMATITE PIG IRON**is steady at about 42/ for mixed numbers in  
usual proportions, while West Coast makers'  
brands are as below:

	No. 1	No. 2.	No. 3.
Cleator.....	42/3	42/	41/9
Lonsdale.....	42/	41/9	41/6
West Cumberland.....	42/	41/9	41/6
Lowther.....	42/	41/9	41/6
Distington.....	42/	41/9	41/6
Solway.....	42/	41/9	41/6
Maryport.....	41/	41/9	41/6
Harrington.....	42/6	42/	41/9

There are 40 furnaces in blast in the dis-  
trict, compared with 44 a year ago. The  
reserve stocks in stores only are 112,288  
tons, or 13,121 tons more than at Christmas  
last. Shipments of pig iron are 24,253 tons  
ahead of last year's, while the rail shipments  
are 1884 tons behind those of last year to  
the same date.**TIN PLATES.**In London since the resumption of busi-  
ness a stronger inquiry has been felt by  
dealers and agents, and the market is cer-  
tainly to some extent firmer than it was a  
week ago. Most of the works are reported  
to be well off for orders, and some of the  
leading houses are not at all anxious to  
book further orders except at a substantial  
advance. I quote good ordinary brands of  
IC cokes 13/6 @ 13/9, f.o.b. Liverpool. At  
Liverpool the Whitantide holidays have  
rather interfered with business. Business,  
however, has revived during the last few  
days, and buyers evince a great deal of  
anxiety to secure their requirements for  
some time forward at the very low prices  
that are now ruling. The inquiry has runfor the season. The Cape mail to hand this  
week has brought rather better orders for  
tools, tubes, guns and wagon ironwork, but  
the trade of South Africa is still far from  
being in a healthy state. German require-  
ments in hardware are fairly steady, but  
otherwise the Continental trade must be  
reported dull. The improvement recently  
noted in the demand from Canada continues.  
At Sheffield the greater part of last week  
was given up to the holidays, and in the  
larger works the whole of the managers  
are glad of the opportunity to get repairs  
and the general overhauling of plant done  
with the minimum of inconvenience. In one  
or two of the larger establishments in the  
railway and war-material branches there is  
enough work on hand to have justified a  
considerable curtailment of the holidays, but  
it is by no means the general state of things.  
The crop of country orders is extremely  
thin, and it is now generally felt that buy-  
ing will remain dormant until the autumn.  
Export orders exhibit but slight variation  
from the average of the last month or two.  
The tendency, so far as American indents  
are concerned, seems to be slightly unfavor-  
able, but it is impossible to say yet whether  
the end of the improved demand from that  
quarter has been reached. Colonial advices,  
on the other hand, are, so far as any altera-  
tion is perceptible, more encouraging, and  
the same may be said of Canadian orders.A very elaborate and valuable paper has  
been published by Dr. John B. Porter, of  
Cincinnati, Ohio, on the iron ores and coals  
of Alabama, Georgia and Tennessee. It  
was presented before the American Insti-  
tute of Mining Engineers. Dr. Porter gives  
a general description of the region, and a  
map showing the coal fields, and then goes  
into a discussion of the lower ores, the red  
ores and the metamorphic ores, classifying  
among the latter the Cranberry, the sub-  
carboniferous ores and the ores of the car-  
boniferous. An appendix contains a very  
large number of analyses of ores, pig irons,  
coals and limestones.On February 2, 1865, a patent was granted  
in France to Micolon & Senecanhez, which  
contains the following: "Considering that  
lime is the most refractory of all materials,  
we propose for certain cases to make the lin-  
ings of furnaces of bricks of quicklime ag-  
glomerated by press, after intimately mix-  
ing with traces of oils or tar, and with 4  
per cent. of pulverized coke, zinc white and  
silica. Under these conditions traces of  
bisulfate are formed which maintain the  
agglomeration of the lime without, however,  
leading to fusion."Buffalo is one of the chief gateways be-  
tween the grain fields and stock farms of  
the West and the markets and shipping  
ports of the East. Twenty railroads center  
there, including all the trunk lines but two.  
There are five regular lines of propellers to  
all the ports of the lakes, besides large  
numbers of other vessels that swelled the  
total number of arrivals and departures last  
year to 6934, representing a total tonnage  
of 4,195,878. During the same time the  
clearances on the canal were 5670. The  
receipts for last year by lake were 64-  
329,230 bushels, and the total receipts by  
lake and rail 90,000,000 bushels—equal to  
84 per cent of the receipts in New York City.A metal that expands in cooling is made  
of lead, nine parts; antimony, two parts;  
bismuth, one part. This alloy can be ad-  
vantageously used to fill small holes and  
defects in iron castings.



Paris, 1878.

**McCAFFREY & BRO.,**

PENNSYLVANIA FILE WORKS,

Philadelphia, Pa., U. S.

For Superiority.



Manufacture and keep in stock a full line of **FILES** and **RASPS** only, for which we claim special advantages over the ordinary goods, and ask domestic and foreign buyers to allow us to compete for their trade.

Superiority acknowledged wherever used, sold or exhibited.

**GAY & PARSONS,**

MANUFACTURERS OF THE

**Double-Action Ratchet Screw Driver.**

ONE OF THE VERY BEST TOOLS EVER INVENTED.



The above Cut shows the action or mechanism complete, also an end view of the Ratchet and Pawls, to which we wish particularly to call your attention, as in all ratchet movements, of whatever kind or nature, the **RATCHET** must be the principal and most important part employed.

It combines greater Strength,

Convenience and Durability than can be obtained in a common Driver.

FOR CIRCULARS AND PRICES, ADDRESS OUR AGENTS

**JOHN H. GRAHAM & CO.,**

113 Chambers Street, NEW YORK.

**LIGHTNING HAY KNIVES.**

WEYMOUTH'S PATENT.



This knife is the best in use for cutting down hay and straw in mow and stack, cutting fine feed from bales, cutting corn stalks for feed, cutting peat and ditching marshes.

The blade is best cast steel, spring temper, easily sharpened, and is giving universal satisfaction. A few moments' trial will show its merits, and parties once using it are unwilling to do without it. Its sales are fast increasing for export as well as home trade, and it seems destined to take the place of all other Hay Knives.

They are nicely packed in boxes, one dozen each of 60 pounds weight, suitable for shipping by land or water to any part of the world.

MANUFACTURED ONLY BY

**HIRAM HOLT & CO., East Wilton, Franklin Co. Maine.**

For sale by the Hardware trade generally.

**CAUTION:**

We are informed that various parties are infringing upon the widely known Letters Patent granted originally to George F. Weymouth for an improved Hay Knife.

The characteristic feature of the invention is a curved blade, provided with saw-tooth cutters, and furnished with suitable working handles. It is our purpose to prosecute all infringements, and to hold responsible to the full extent of our ability and of the law all parties who manufacture any knife infringing upon the patent, or who deal in the same. Several suits have been already ordered.

All manufacturers and dealers are hereby warned of our rights, and the public are cautioned against purchasing any Hay Knives which are not of our genuine manufacture.

**HIRAM HOLT & CO.**

East Wilton, May 10, 1886.

**TACKS AND STAPLES**  
A COMPLETE LINE OF  
Double Pointed & Steel Wire Tacks, Blind, Bod Spring, Telephone & other Staples.  
The Large Head 1 1/4 in. Full Weight.  
Steel Wire Tacks, Uniform, Dot Uniform  
are put up either in 100 or Assorted 100 papers.  
Outside of all Combinations.  
Send for Catalogue.

**RIPLEY & BARTLETT, TACKS**

MANUFACTURERS OF

Swedes and American Iron Tacks of all Kinds.

**TRUNK AND CLOUT NAILS**

A SPECIALTY.

Any variation from regular sizes and shapes made to order from samples.

WORKS AT  
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MASS.**TACKS & WIRE NAILS**BOSTON SALESROOM,  
70 Portland St.BALTIMORE SALESROOM,  
73 German St.NEW YORK SALESROOM,  
116 Chambers St.**AMERICAN TACK CO., Fairhaven, Mass.****Nicholson**

Trade

Extra [X F] Fine,

Mark,

**FILES.****Needle Files.**

The Round Handle are Manufactured in 4 Lengths, as Shown above, viz.:

4 in., 4 3/4 in., 5 1/2 in., 6 1/4 in.

OF TWELVE DIFFERENT KINDS.

Round,	Half Round,	Flat,
Oval,	Knife,	Square,
3-Square,	Equaling,	Sitting,
Joint,	Barrette,	Marking,

and of 3 different degrees of fineness of cut, Nos. 2, 4 and 6.

These Files are used by Jewelers, Silversmiths, Tool and Die Makers, and every Mechanic should have a dozen or more in his tool chest.

**The Square Handle**

a more delicate file for the use of Watchmakers. Made 5 1/2 in. long, as shown above, and of the same shapes and cuts as the round handle, or of finer cut if desired.

**NICHOLSON  
FILE CO.,**

PROVIDENCE, R. I.,

Sole Manufacturers.

**BLACK DIAMOND FILE WORKS.**

TRADE

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**G. & H. BARNETT,**

21 to 43 RICHMOND STREET, - - - PHILADELPHIA.

**CHARLES B. PAUL, MANUFACTURER OF HAND CUT FILES,**

Warranted Cast Steel.

187 Tenth St., Williamsburgh, N. Y.

All descriptions of Files made to order. Price List mailed on application.

Established 1863.

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Manufacturers of all kinds of  
**FILES, RASPS.**

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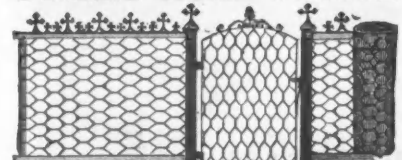
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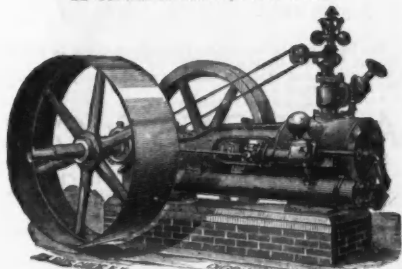
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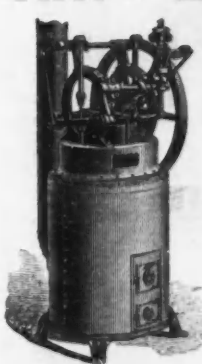
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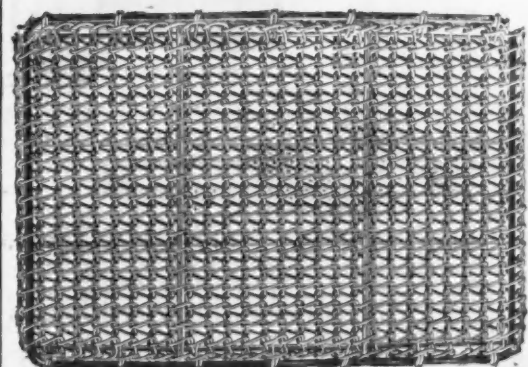
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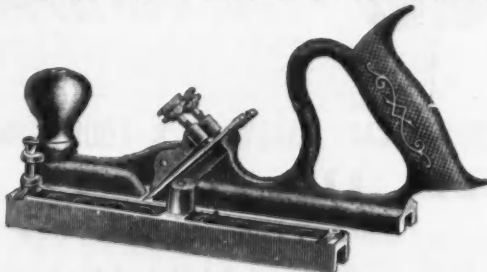
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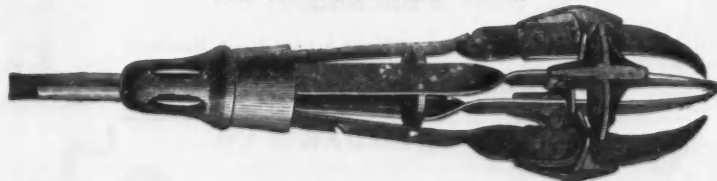
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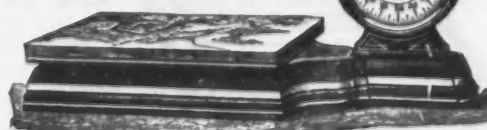
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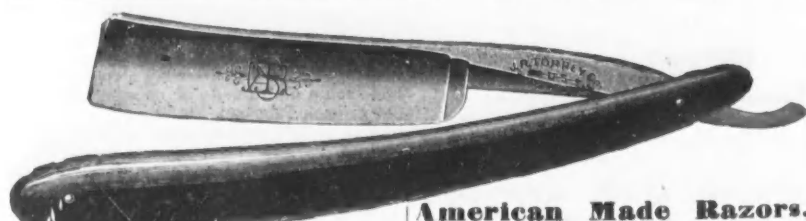
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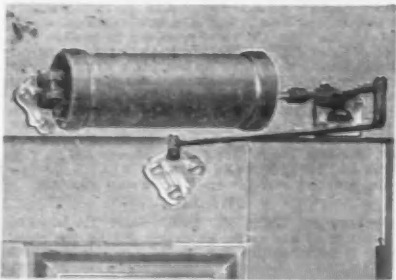
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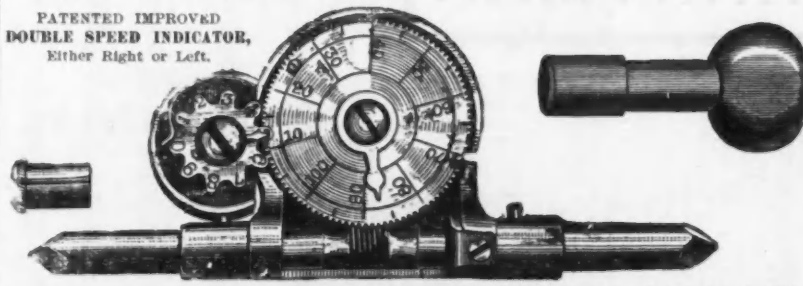
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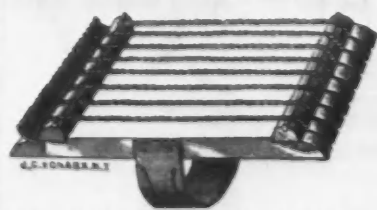
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December 26, 1871.

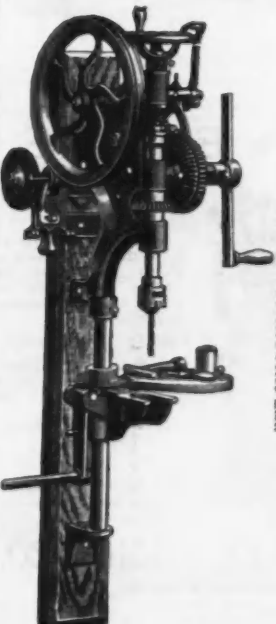
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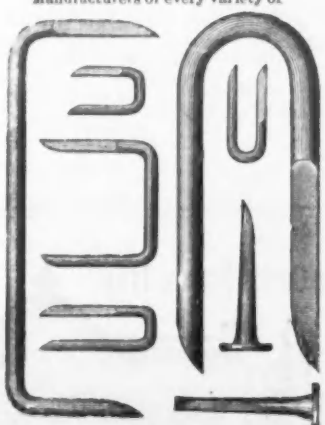
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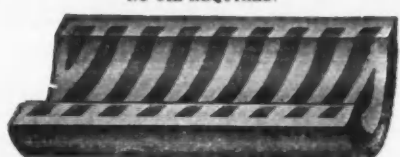
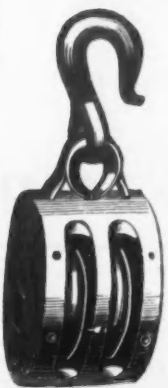
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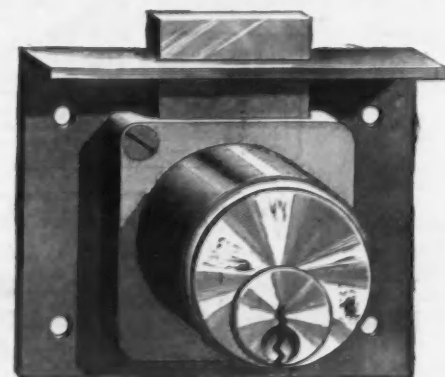
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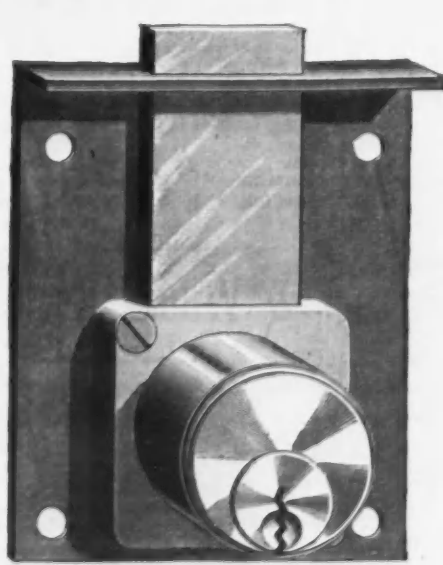
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Full Size of Corrugated Key.



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## THE WEEK.

As illustrating the growth of the dressed beef traffic of Chicago, it may be stated that in 1884 there were shipped from Chicago and from Hammond a total of 498,000,000 pounds; in 1885 Chicago shipped 465,500,000 pounds and Hammond 110,500,000 pounds, making an aggregate of 576,000,000 pounds of beef, or 28,280 carloads of 10 tons each. That number of cars would make a train 180 miles in length.

A strange phenomenon is observed lately in the Alpine and Sub-Alpine regions of Southern Germany. Not only have the pine forests sensibly diminished, but replanting has become remarkably unsuccessful. A new and as yet unexplained agency not only produces gradual decay among grown trees of the most valued conifers, but checks even the most scientific efforts toward replacing the loss thus sustained. This is the case in Bavaria. Within the last few years extensive pine nurseries have singularly failed. Under the most judicious care young trees would take root, grow for a short time, then come to a standstill, linger for a while, and finally die off. This has occurred to such an alarming extent that the forestry department at Munich, at a loss to account for it, has, at least privately, entertained the idea of, so to say, "infusing new blood" into its forests by the introduction of foreign species. Its attention has been turned to India and to the United States, to the Himalayas and to the Rocky Mountains. It is particularly the genera *Abies*, *Pseudotsuga* and *Picea* which are favorably looked upon as fit to become substitutes for and successors to their waning congeners in the Bavarian Tyrol.

The Peruvian Government will open a mining exposition at Lima, June 1, 1887.

The Government of Ecuador have made a contract with British capitalists for the building of a railroad 139 miles in length and costing \$5,000,000, which Congress is expected to ratify. It is said that the Galapagos Islands have been mortgaged to secure the money required.

The northern or mountainous part of Morris County, N. J., has within a few years become the greatest powder manufacturing center in the United States. The works of the Atlantic Dynamite Co. are at McCainsville, and those of the American Forcite Co. are at Lake Hopatcong, while the United States Government is building extensive works at Middle Forge for the manufacture and storage of powder. The two first named companies are the largest manufacturers of dynamite powder in the country, and their aggregate production will amount to fully 10 tons a day. At the Atlantic dynamite works, on Friday, the mixing-house, containing 2500 pounds of nitro-glycerine was blown up and 10 workmen lost their lives. A single ounce might have been equally destructive. The company were engaged in filling a contract for 9,000,000 pounds of dynamite for the New York Aqueduct, and several years will be required to complete it.

An electric railway 2 miles in length has been successfully operated in the suburbs of Baltimore for several months. The Daft motor is employed, and as now run two engines take the place of 30 horses and are as cheap. The sections of the conducting rails as well as the track rails are connected by wires. In some places the wires are not insulated, and the rails are connected by a loop of copper wire  $\frac{1}{4}$  inch thick. The connections at the main dynamo are of copper wire,  $\frac{3}{4}$  inch, insulated. At the engine-house there is a boiler 14 feet long and 5 feet in diameter, with 63  $\frac{1}{2}$ -inch flues. The engine is 16 x 24 inches cylinder, which develops about 75 horse-power with 30 pounds of steam, making 110 revolutions a minute. This engine drives two 50 horse-power Daft dynamos, which furnish the current to the middle rail. When both motors, each with a loaded car attached, are ascending the steepest grades, the engine is used to its fullest capacity, but on a level not 10 horse-power is used. This engine uses about 1  $\frac{1}{2}$  tons of coal a day in 18 hours, fires being banked at night. Two motors, each weighing about 4500 pounds, of 10 horse-power, are in use. Recently another motor, weighing about 5000 pounds, has been introduced, and is rated at 20 horse-power. The motion of the armatures is about 1200 revolutions a minute, and they are geared to the driving axle of the motor by ordinary tooth-gear wheels, in the proportion of 12 to 1. The speed of the motor has been arranged for 12 miles an hour, but 20 miles an hour can easily be attained.

Local Assembly 116, Knights of Labor, in Philadelphia, composed of stove molders, ignored the settlement of a strike made by the District Executive Board at the stove works of Thomas, Roberts, Stevenson & Co., and the 200 hands are ordered to stay out.

Treasury officials in Mexico assert that the new fiscal year will show a gain of 10 to 15 per cent. in the national revenues, owing to a stricter manner of collection.

The Connecticut River and the streams that make it furnish power to 2298 mills. These take 118,026 horse-powers. The greatest number on any one stream are on Miller's River and its tributaries 188, with 7572 horse-powers; the second is Chicopee River and its tributaries, 192 mills, with

14,904 horse-power; and the Farmington is third with 178 mills and 8852 horse-power. The greatest power, however, is taken from the Connecticut itself, whose main stream supplies 98 mills with 23,366 horse-power.

An examination of the books shows that the Lewiston Cotton Mills, in Maine, have been run 21 years at a net loss of \$1,703,093.

The new Florida orange crop is carefully estimated at 600,000 boxes. The "freeze" merely demonstrated in what sections of the State the business can be profitably followed.

A pamphlet setting forth in glowing hues the resources of British Columbia has been widely disseminated in the interest of the Canadian Pacific Railway, from which it would appear that there is room for the profitable employment of millions of money, with innumerable chances of creating business. Coal and iron are among the attractions.

Ex-Gov. Alex. R. Shepherd, who is at the head of a mining company in Chihuahua, writes to a Member of Congress respecting the Mexican treaty, as follows: "It is true that the present Mexican tariff (like that of the United States) is in many respects oppressive and burdensome, but it is also true that efforts are constantly being made by the Government to adapt it to the necessities of trade, and it cannot be doubted that a proper spirit manifested by the United States Government would be met more than half-way by the Government of Mexico, and permanent good result to both countries." Mr. Shepherd, after a residence of seven years in Mexico, says, further, that the person and property of an American pursuing the peaceful advocations of industry and commerce are as secure in Mexico as in any part of the United States.

An over-issue of certificates of loan by Treasurer Wilson and his official predecessor in the Chesapeake and Delaware Canal Co., to the extent of \$600,000 and upward, creates a feeling little short of consternation among financiers in Philadelphia. The president of the company states that until a full examination is made and all the certificates are shown it will be impossible to make any definite statement. Whether the genuine and fraudulent certificates can be separated from each other is not known yet, but the belief is strong that no distinction can be made that will relieve the company's responsibility.

Traffic on the canals since the opening of navigation has increased remarkably, especially bearing in mind the labor disturbance at Chicago, one of the principal shipping points in the West. The official statement shows a tonnage in May and June amounting to 1,507,433 tons, as against 1,189,012 tons during the corresponding months last year. Increase for 1886, 318,521 tons, which, on a basis of a seven months' canal season, would indicate an increased tonnage for the year of over 1,250,000 tons. The increase is mainly in wheat and iron ore. The shipment of corn is materially decreased because of the threatened heat in the supply in the warehouses.

The Law and Order League, which organized at Sedalia, Mo., with the design of preventing labor disturbances, is now said to have a membership of 17,000, mostly in St. Louis.

Cotton in the South has been injured by too much rain, and corn has suffered.

The total output of the Eau Claire lumber regions in Wisconsin this year will probably reach 450,000,000 feet, considerably exceeding that of last year.

A seat in the New York Stock Exchange is equivalent to a competency for life. Any one of the 1100 members has an opportunity to make money surely and easily by means of the exclusive privileges granted to those who have the right of the floor. Many of the members are never seen at the Exchange, however, and the appearance in person of a heavy operator like Cammack among the regular manipulators and scalpers is a kind of sensation. The price of seats varies greatly. Last week, for instance, a seat sold for \$27,000, which is \$5000 less than was paid six years ago for it.

George W. Porter, secretary of the Baltimore Board of Trade and connected with the commercial interests of that city for many years, died July 5.

The salmon catch on the Columbia River turns out almost as well as a year ago.

A brisk trade is springing up in River Plate frozen mutton, which promises in a few years to rival the wool business. According to the British Board of Trade returns, the arrivals in Great Britain from Buenos Ayres in three months ending March 31, 1886, were 30 per cent. of the total.

Massachusetts will have a State Board of Arbitration, the three members to be appointed by the Governor.

Two steel Clyde-built steamships will be bought in England shortly for the Red Star Line.

The arrivals in New York of vessels from foreign ports during the month of June numbered 599, of which 252 were British steamers, while of the arrivals of American vessels, comprising 209 in all, 146 were



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COMPRESSED IRON AND STEEL SHAFTING. IRON AND STEEL BOILER PLATE.

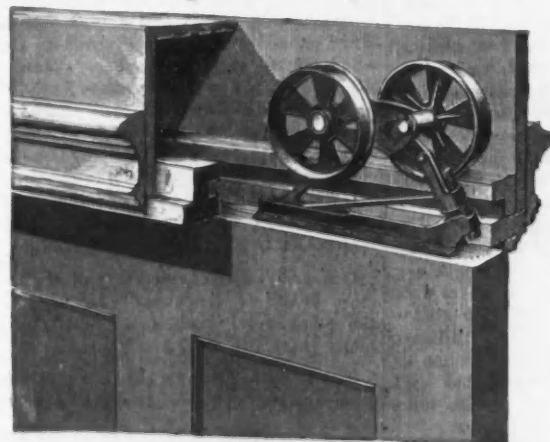
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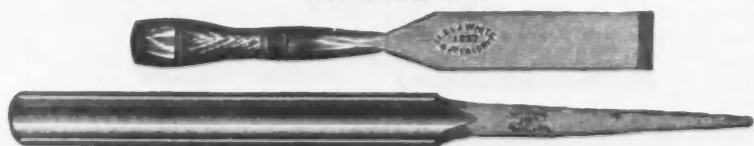
The only Hanger made that  
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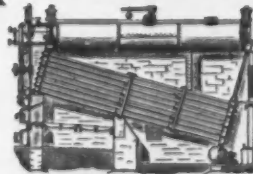
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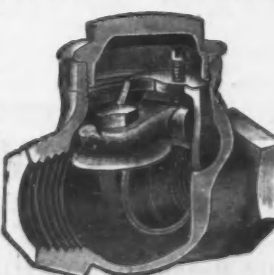
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For Steam Boilers, Water  
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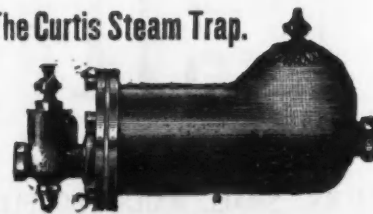
THE ADVANTAGES OF THIS  
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separate from the body of valve,  
can be instantly renewed by  
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without disturbing the pipe con-  
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**TITUSVILLE, PA.**

brigs and schooners. The arrivals from domestic ports indicate a more healthy growth in the American mercantile marine, the total being 1576, including 156 steamers, which is the largest number recorded in June for many years.

Three and a half miles of electric cable have been laid under ground in this city, and work satisfactorily. On one part of the line, where water and gas mains offered serious obstruction, the system adopted by the fire department was used as a substitute.

Four men who were convicted of extorting \$1000 from Geo. Theiss as one of the conditions upon which his music establishment in this city would be relieved from a boycott were on Friday sentenced by Judge Barrett to hard labor in the penitentiary, the worst offenders getting two years and 10 months.

Building operations in Brooklyn have been seriously affected by the recent strikes, as shown by the statistics of the Building Commissioner. During the last month permits were issued for 299 buildings, to cost \$1,395,530, as compared with 368 buildings authorized in June, 1885, which were estimated to cost \$2,055,493.

Harcot's machinery manufacturing establishment, in the suburbs of Paris, was destroyed by fire on the 1st inst. Loss \$250,000.

The Senate special Committee on Under- valuations have apparently arrived at the conclusion that they are unequal to the task which they have assumed, their investigations at various custom-houses having been attended with little practical result.

The new Sound steamer City of Brockton, for the Old Colony Steamship Co., to ply between Fall River, Newport and New York, was launched on Thursday from the yard of Montgomery & Lowe, in East Boston, and will receive her machinery in this city. She will cost over \$225,000, and measures over 3000 tons.

The induction of Prof. Timothy Dwight as the successor of Dr. Noah Porter into the presidency of Yale College marks the beginning of the existence of that institution as a university.

The most remarkable refrigerating warehouse in this city is that of F. C. Linde & Co., on St. John's Park, an immense building covering an entire square. The various sections are formed by introducing heavy fire-proof partitions of iron and a sort of cement, with sliding doors of like material. The refrigerating-rooms are thickly lined with sawdust, and each have an ante-room, the outer door of which is first closed before the inner door is opened. The sides are lined from top to bottom with large pipes, through which ice-cold brine is constantly circulating. A thermometer ascertains the degree of temperature and telegraphs it to the pump-room, where the corresponding indicators afford the means of ascertaining at any moment the degree of cold in any given store. One of the instruments is a register, which makes a constant permanent record of the temperature, so that the history of every moment is capable of being read. The process of refrigeration is carried on without the use of ice, pure anhydrous ammonia alone being employed. The ammonia is charged into pumps having a cylinder filled with water surrounding an inner cylinder containing the ammonia. There are seven of these pumps, having a cooling capacity of 210 tons of ice per day, worked by two engines, one of 75 and one of 150 horse-power, and the ammonia is conveyed by pumping to the roof of the building, subjected successively to compression, expansion and condensation, returning from the roof into large tanks filled with salt brine from the Syracuse wells, permeated throughout by a coil of small pipe or worm through which the ammonia flows, imparting an intense degree of cold to the brine. The pipes communicating with the tanks, though exposed to the heated temperature of the pump-room, are constantly covered with a thick coating of ice. At least 10 miles of pipe are employed in this establishment. Only a moderate degree of cold is generally required.

At the instance of Cornelius Vanderbilt the New York Central Railroad Co. has set apart a plot of ground, 40 x 50 feet in size, at the Grand Central Depot in this city, unavailable for railroad purposes, for the use of the employees of the road, and upon this Mr. Vanderbilt will erect a handsome structure for the men. The various arrangements will include bathrooms, gymnasium, reading-rooms, &c.

The Pittsburgh Iron Car Works, capital \$60,000, are in course of organization.

Silk interests are advancing rapidly in Mexico. Although at present the industry is in its infancy, comparatively speaking, there are now three or four well-equipped factories in the Republic and the raw material is yet insufficient to supply their demands.

An inquiry into the condition of the workman in the Northwest now as compared with 10 years ago affords interesting facts. Taking the wages paid in St. Paul, Minn., and other cities west of Chicago as a basis, it is ascertained that the average wages paid to mechanics and workmen have steadily increased in almost every branch. This is notably true of railroad employees, and it is observed that the pro-

portion of skilled workmen as compared with those who are not is larger. Meanwhile the cost of living is reduced excepting in the matter of house rent, which has changed but little. Clothing is about 25 per cent. cheaper, as shown by the relative price of staple goods, and table supplies generally are less now than then.

The merits of the several ports in the Maritime Provinces of the Dominion are being vigorously discussed with reference to a selection for the Atlantic terminus of the Canadian Pacific Railway. St. John is one of the best, but harbor interests have been neglected. Further east Halifax is unsurpassed and is well equipped as to wharf accommodation, elevators, &c. Whitehaven, situated below the mouth of the Gut of Canso, is said to be an excellent harbor. It is still nearer to Europe than Halifax, and the Canadian Pacific may extend to that point in time. The winter ports of Cape Breton, such as Louisburg and Sydney, remain. They are good harbors, but to what extent they are affected by the ice movement in the spring is not stated.

The Canal Union hold a convention at Syracuse August 25, at which all manufacturing, labor and mercantile organizations will be represented to advocate the lengthening of the canal locks and deepening of the channel.

Charles Fisher, who has been chief civil engineer of the New York Central and Hudson River Railroad, has resigned, and Walter Katte, of the West Shore road, has been appointed chief of both roads.

The water supply of the City of Amsterdam, in Holland, is to be enlarged by an extension capable of delivering 9,000,000 gallons per day designed exclusively for manufacturing and sanitary purposes, the water already received from the sand hills being reserved for domestic purposes. The new works comprise the laying of a 48 inch inlet conduit-pipe almost 3 miles in length from the River Vecht to the site of the pumping and filtering station. At this point the water will be lifted into depositing reservoirs having a united capacity of 18,000,000 gallons. After having been filtered through filter beds of novel construction, designed by the engineers, the water will pass into a series of covered pure water reservoirs. From these it will be pumped up a stand-pipe 232 feet in height, and conveyed thence through two lines of parallel mains 27 inches and 24 inches in diameter respectively into the City of Amsterdam, a distance of about 7 miles. The separate system of supply will involve the laying of upward of 120 miles of distributing pipes, including the exceptionally difficult work of crossing under no fewer than 100 of the canals with which Amsterdam abounds, some of which are of great width and depth. The entire series of works has to be completed by the autumn of 1887.

Judging from the fact that 1755 miles of new railway have already been laid this year, the *Railway Age* predicts that the total for 1886 will reach 6000 miles, which is the largest for any year thus far with only four exceptions. Very little work is being done in the older States, but some of the companies whose lines extend westward from Chicago are building, or preparing to build, hundreds of miles in the territory west of the Missouri.

The population of Chicago, as indicated by the new directory, is over 750,000, an increase of 50,000 in the last year. The city of Brooklyn, according to similar computation, has 768,000.

At Cuyahoga Falls, Ohio, 2d inst., J. B. Harrison's machine shop and J. T. Davis's chain works were burnt by the careless throwing of fireworks.

A so-called "reform convention," held in Montreal, the 2d inst., with the object of advocating Canadian independence, passed resolutions in favor of the abolition of duties on coal, flour and the raw materials of the manufacturing industries. A complete measure of reciprocity with the United States was adopted as one of the main planks of the Liberal platform.

Several big contracts for work on the Brooklyn Bridge were given out on Friday. William Wright, of Newburg, N. Y., will furnish engines for \$14,910, and the South-wark Foundry and Machine Co., of Philadelphia will supply the rest of the new cable driving plant for \$17,836.25.

The estimated wheat production in the United States this year is given by the Cincinnati *Price Current* after special investigation. The winter crop is put down at 295,000,000 bushels, against 212,000,000 last year. The estimate puts California at 60,000,000; Illinois, 28,000,000; Indiana, 32,000,000; Ohio, 34,000,000; Michigan, 25,000,000; Missouri, 25,000,000. Spring wheat is estimated at 140,000,000, against 138,000,000 last year. The quality of the winter grade is reported to be better than last year. Grain dealers profess to have information that there will be a large deficit in the French wheat harvest, and that the wheat crop in the United Kingdom is also 15 to 18 per cent. short of an average.

The Electric Subway Commission have resolved that all the wires must be buried in a conduit constructed of asphalt concrete. In form the subway shall be that of a conduit with manholes, where insulated wires may be readily drawn in or out.



# The Iron Age

AND METALLURGICAL REVIEW.

New York, Thursday, July 8, 1886.

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JAMES C. BAYLES, - - - Editor.  
CHAS. KIRCHHOFF, Jr., - - - Associate Editor.  
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The office of this journal is removed to 66 and 68 Duane Street.

## The Business Outlook.

R. G. Dun & Co.'s circular of record and prophecy, bearing date of July 1, is a document well calculated to create a hopeful feeling in business circles. Primarily it shows a falling off in the number of failures during the first half of the present year, as compared with the first six months of last year. The comparison is as follows:

First Six Months.	1885.	1886.
Failures.....	5,156	6,004
Liabilities.....	\$50,434,460	\$74,722,355

This favorable showing may be accounted for in several ways. During the long period of business depression through which we have passed, the financially weak and badly managed concerns have mostly gone to the wall. Few wildcat or speculative ventures have been started, and it is probable that, should depression continue indefinitely, the number of failures would grow less and less each year. In a word, the times through which we have passed are not such as promote numerous or heavy failures, since they invite caution and a close scrutiny of credits. It will not do, therefore, to predicate too much upon the fact that there have been fewer failures since January 1 than were reported during the same period last year. More than anything else it shows that there has been no revival of business activity and no extension of commercial credits. Of the future the circular says:

There appears to be a better adjustment of values prevalent than for some years past, offering surer opportunities for a profit in the transaction of business. A certain settled standard has succeeded the shifting, unknown basis which has hitherto prevailed, and is a powerful aid to the establishment of the confidence now being gradually restored. The earning power of large corporations, whose securities are held widely throughout the country, such as railroads, manufacturing concerns, banking and other representative institutions, is now apparently more assured than at this time last year. The steady improvement in the railroad situation is the best indication in this direction, reports showing not only an increased tonnage, but at rates that yield fair returns. A more certain income for a large class of security holders may therefore be relied upon, and a more settled condition of trade

among this class is thereby rendered possible. There is a great increase in the class of security holders, and the number of people in the United States who now live upon the interest of their investments and loans has of late years enormously increased. Whatever contributes to permanency and certainty of income for this class helps general trade now to a greater extent than ever before. Hence the cessation of the great railroad wars, which last year were so destructive of values, is of importance as indicating that the immense capital invested in this means of communication is now likely to earn a fair return, a matter of great importance to the general trade of the country.

The growth of wealth and money-earning capacity of this vast country in the last few years is illustrated by the gradual decline in the rate of interest, the consequences of which are likely to be very important. The rates now prevalent of 4 or 5 per cent. are almost as universal as five years ago were 6 and 7 per cent. This cheapness of money, while on the one hand it indicates a great abundance and an approach to the monetary conditions which prevail in the wealthiest countries of the Old World, is likely on this new continent to have most important consequences in the extension of undertakings impossible in countries less in size and with restricted resources. This cheapness of money, with confidence restored and a fairly prosperous condition of affairs existing throughout the country, is likely to stimulate all new enterprises, while the economy with which business can now be transacted, owing to the low rates which prevail, is full of encouragement for the future.

It would be difficult to imagine a more favorable set of conditions than those now prevailing, and, except for the high taxation, which Congress has thus far failed to reduce, and its failure to pass a bankrupt law, so that uniform action for the protection of debtor and creditor could be secured, there is little that needs to be done to offer the best possible chance to the trader, the manufacturer or banker to pursue a profitable and satisfactory career. With failures so few, notwithstanding adverse conditions, with the country growing rapidly year by year, with money at low rates of interest, and with few disturbing elements, there seems fair reason to anticipate a prosperous autumn business.

Much of this is exaggerated and misleading; some of it is quite true and proportionately reassuring. The railroad quarrels in the West are by no means settled, and nothing in the present situation gives assurance of a permanent increase of income for the holders of these securities. We also fail to see in what consists the present assurance of better earnings and larger dividends for manufacturing corporations. The cheapness of money is due to the fact that there is but little demand for it, and a stagnant money market always indicates stagnation in general business. Undoubtedly there are many encouraging indications in the situation, but they are not enough to warrant extravagant predictions in the near future.

We are quite willing to admit that the indications warrant the belief that the tendency is in the direction of improvement, but it is of the utmost importance that all efforts to create an exaggerated idea of the present and prospective activity of trade be discouraged. There was very little real ground for the rosy prophecies which ushered in the present year, but these prophecies defeated their own object. They created in the minds of the working classes the impression that a tidal wave of prosperity had overtaken the country, and that labor was wronged in being refused the chance to discount the promise of the future in immediately increased wages. The result was a succession of strikes and disturbances unparalleled in the history of the country. The promise of the year was blasted, and labor is not so far instructed by the teachings of experience that the experiment can safely be repeated. It is also well to remember that there is a vast amount of money lying idle waiting for a chance to make a profit in speculation, and that anything calculated to encourage a "boom" cannot but be productive of disaster. If we are on the eve of better times, let us approach them cautiously and with as little excitement as possible. Under present conditions a boom would be short-lived and its results deplorable. For this reason we deprecate any attempts to make the situation appear better than it really is. There is nothing to gain by such a course and much to lose.

## Imports of Iron and Steel for the First Five Months.

The official import returns, including the month of May, just issued, do not on the whole show any movement of special significance. We tabulate below the figures covering the first five months of the calendar years 1885 and 1886, and those giving the total for the first 11 months of the fiscal years ending April 30:

Articles.	First 5 mos. Calendar yrs.		First 11 mos. Fiscal yrs.	
	1885.	1886.	1885.	1886.
Iron ore.....	421,497	148,517	634,195	381,359
Pig iron.....	145,140	56,581	224,700	141,570
Iron.....	35,130	5,654	42,817	19,361
Steel scrap.....	8,698	996	3,591	4,306
Bar iron.....	9,360	7,150	30,779	30,386
Steel rails.....	9,299	1,632	9,464	4,127
Cotton ties.....	244	2,659	13,032	14,556
Band, hoop and scroll iron.....			113	356
Steel hoops, bands, strips, sheets and plates.....	882	525	2,985	1,041
Steel ingots, blooms, slabs, billets and bars.....	36,321	8,862	55,216	16,659
Sheet, plate and taggers iron.....	1,798	712	5,796	5,831
Tin plates.....	119,361	90,683	226,415	204,334
Wire rods.....	73,560	34,384	125,987	108,811
Wire and wire rope.....	1,329	657	2,736	1,570
Anvils.....	457	213	725	548
Chains.....	298	308	337	559

The total values of the imports of iron and steel for the first 11 months of the fiscal years 1885 and 1886 respectively were \$33,463,377 for the latter, against \$30,909,582

for the former. This includes the following items not enumerated in our table given above, which covers only tonnages:

	Eleven months—fiscal years.	1885.	1886.
Cutlery.....	\$1,511,513	\$1,321,127	
Files, file blanks, rasps and floats.....	44,931	44,187	
Firearms.....	769,539	1,066,987	
Machinery.....	1,055,305	882,550	
Needles.....	300,694	307,798	
All other manufactures.....	1,297,145	1,652,103	

A glance at the table of tonnages shows a continuance of the heavy importing movement in iron ore, in pig iron, steel blooms and billets, and iron rods. Scrap iron was still coming in in large quantities in May, and we know of lots from distant countries now afloat for this market on a speculative venture. Ore has been more active of late, and there is a decided growth in the business in making Bessemer pig from foreign raw material in the East, a number of furnaces having already changed or being about to change. It should not be assumed, however, as is largely done, that all the ore imported is used for making Bessemer grades of pig iron. A number of Eastern furnaces are employing it in admixture with domestic ores and mill cinder in the manufacture of other grades. Pig iron so made is selling at about \$18 at furnace, while foreign pig is not quoted at tidewater lower than \$18.75. Until now the large shipments of Bessemer pig from England have had the effect of keeping freights from Glasgow comparatively high, thus making the importing price of Scotch foundry irons higher than they would otherwise be. In other directions there is nothing worthy of special movement in the import trade.

## A Departure in Water Heating.

In a paper entitled "Flame Contact—A New Departure in Water Heating," Mr. Thomas Fletcher, the well-known English investigator, recently presented to the British Gas Institute particulars which in various shapes have for some time past excited the interest of engineers and scientists generally. Mr. Fletcher undertook to prove on theoretical grounds, and also by experimental demonstration, that the present accepted system of water heating by gaseous or other fuel is a very imperfect means for an end, and is, both in theory and practice, essentially faulty. Directing attention to the well-known fact that it is impossible to obtain flame contact with any cold or comparatively cold surface, as, for example, the heating surface of a steam boiler, and noting the consequent waste of heat counteracted in a measure by an extension of surface in contact with the water, he proposed to supply water-heating vessels with a number of rods (copper rods in the case which he specially illustrated) depending from the lower surface, each rod passing through into the water space, and being flattened into a broad head which would give up its heat rapidly to the water. Mr. Fletcher's theory can be stated in a few words. The lower ends of the rods, not being in close communication with the water, can and do attain a temperature sufficiently high to admit of direct flame contact, and as their efficiency, like that of the water surface, depends on the difference between their own temperature and that of the source of heat in absolute contact with them, a far greater duty is obtained from them, provided the theory is correct. Although the surface of the rods, being vertical, can be calculated only for evaporating power at one-half that of a horizontal surface, as is usual in boiler practice, the margin of increased duty, Mr. Fletcher claims, is so great that this may be ignored and the whole may be taken at what its value would be as horizontal surface, and a duty may be obtained 50 per cent. greater from a surface the same in area as a flat-bottomed vessel on the fireside, but having only one-third the surface area in contact with the water. This really means that the area in contact with the flame is something like six times as efficient as the other. What the temperature is which admits of flame contact has not yet been thoroughly tested, and it will need some consideration how the determination of this is to be correctly made. At the same time it is a question in physics which should be capable of being satisfactorily answered. Taking the other side of the question, Mr. Fletcher points out that if the efficiency of a surface depends on flame contact there must of course be flame, or at least gases of an extremely high temperature, and we therefore cannot expect this extraordinary increase of efficiency in any part of a boiler except where flame exists. If the projections are placed in a boiler anywhere except in contact with flame their efficiency must be reduced to that of ordinary heating surface.

Granting that Mr. Fletcher's claims to high efficiency can be well sustained, it must be remembered that in putting his idea into practical shape in a steam boiler, for example, discouraging difficulties will be encountered. Of these, however, he has not altogether lost sight. Thus he remarks that to put such rods as he refers to in a boiler plate necessitates the latter being drilled all over with holes, causing a dangerous source of weakness, as the rods cannot be used as stays. Further than this they would render really efficient examination a matter of extreme difficulty and would be liable to give rise to frequent and almost incurable leaks. All this he proposes to avoid by using, instead of the rods, webs or angle ribs rolled

in the plates. With these, he has found, the same results can be obtained as with the rods. The experiments in this direction tend further to the conclusion that circular webs, which would be of great service in strengthening flues, are not so efficient for heating as webs running lengthways with the flue and in a line with the direction of the flame. This point, however, is being further investigated, and comparative results obtained with the two different forms of web may soon be available. It is interesting to note here that the idea of using such webs is not altogether new and has been put to practical test in Germany with remarkable results. The boiler in this particular case was provided with longitudinal internal ribs, and the figures, as we remember them, showed an abnormally great increase over the evaporative power of another entirely similar boiler, but without the ribs. The report of the tests, however, was indefinite and the results lacked confirmation. Still other experiments made in Belgium about two years ago were devoted to investigating the influence of a number of small projecting points on ebullitions, or rather their influence in preventing the spheroidal state of water. From these, so far as we know, nothing of practical value was derived. The tests were conducted on a small scale—in fact, they were nothing more than lecture-room experiments. To a certain extent the main idea followed out in both of these sets of trials is similar to that of Mr. Fletcher. We can find in his paper, however, no very definite statement as to whether he proposes using ribs on both sides of the plates, on the inside only, or only on the outside. Very probably his plan is to use the ribs on both sides, in which case it is, at least in part, impracticable, and cannot be seriously considered. It may serve to increase the evaporative power of the boiler, but accumulations of scale will rapidly counteract and even overbalance any tendency of this kind. Flame contact, on which Mr. Fletcher lays so much stress, may undoubtedly be studied with profit, but to be successful and of practical value, in steam boilers above all, it should be secured without internal complication. Mr. Fletcher, we understand, is at present engaged in testing with experimental boilers of the Cornish and Lancashire types, and his results may perhaps contribute largely to the adoption of a simpler and correspondingly more satisfactory arrangement.

## Business Prospects in Countries South of Us.

Although colonial produce has not improved in value, if we except coffee, but in a few instances, like sugar, is even lower, business prospects are on the whole fair in countries south of us, owing to thorough pacification in all quarters, even in Peru. Since President Diaz again took the helm of government and reorganized the finances everything has gone on smoothly in Mexico. Our export to that country last year was \$7,271,783, against \$8,730,928 in 1884. It would in all likelihood have increased somewhat even this year if the reciprocity treaty had not definitely fallen through.

Central America has fine crops. Costa Rica, for example, produces 160,000 quintals of coffee, worth about \$13 per 100 pounds at present prices. We shipped thither \$2,446,386 of goods, against \$2,986,228 in 1884. The Cuban budget shows for 1887 an estimated revenue of \$26,250,000, and an outlay of \$26,125,000. The issue of bonds to consolidate the floating debt placed on the European market, to the amount of \$34,000,000, has been a success, capitalists taking it readily on the favorable terms attached to it. This will pave the way for more loans to complete the railroad system of the island. The sugar crop is estimated at 700,000 tons, being slightly in excess of its predecessor. Our shipments to Cuba were \$9,466,045 last year, against \$9,160,589 the year before. Porto Rico is progressing normally, and prospects are fair. We shipped to the island in 1885 \$1,732,256 worth of goods, against \$1,834,852 in 1884.

Haiti has settled all money claims arising out of the last rebellion satisfactorily. The Government is firmly seated, and President Salomon is trying his best to regenerate the country. Our shipments were \$3,189,604, against \$3,346,645. In St. Domingo both sugar and tobacco culture is making steady headway and politics are quiet, and the outlook is encouraging for American capital invested there. We shipped in 1885 \$989,598, against \$974,119 in 1884. The British and other West Indies were at first complaining of drought, but the cane fields now promise an average yield; the same in Guiana. The shipments of domestic goods made to those countries compare as follows:

	Calendar year.	1885.	1886.
To Danish West Indies.....	\$594,922	\$598,909	
To French West Indies.....	1,469,762	1,468,508	
To French Guiana.....	108,251	66,698	
To British West Indies.....	7,446,536	7,642,217	
To British Guiana.....	1,649,536	1,613,514	
To British Honduras.....	368,423	354,782	
To Dutch West Indies.....	682,621	596,109	
To Dutch Guiana.....	320,585	308,899	

Total ..... \$12,497,498 ..... \$12,651,336

showing but a small falling off, owing to greater cheapness of the goods sent.

The difficulty between Colombia and Italy is amicably settled, and the Republic is recovering fast from the last formidable rebellion. Crops are abundant. We shipped in 1885 \$5,321,035, against \$5,862,042 in 1884. News from Ecuador is favorable.

Politically the country is quiet, the cocoa crop large, and money has been raised in Europe for railroad purposes. Venezuela has re-elected Guzman Blanco, who before leaving Europe made a favorable debt settlement with France. Our trade with Venezuela is becoming more active yearly, the country being in a highly flourishing condition. Direct steamers arrive from Ciudad Bolivar, on the Orinoco, to New York. Shipments, \$3,033,790, against \$2,658,922.

Brazil has been very successful with her European loan, bringing with it a vast improvement in the rate of exchange and stimulating the entire trade movement. The coffee crop will be both early and large; the sugar crop less so. Shipments, \$6,640,024, against \$8,047,370. In Uruguay the late revolutionary landing proved a disastrous failure, and President Santos is again in power. Everything is prosperous; the finances are fully in hand and solid. Shipments to that country last year were \$1,267,132, against \$1,575,117 in 1884. In the Argentine Republic an attempt was made on President Roca's life on May 10, without wounding him seriously. The gold premium was at latest dates 156, but in spite of the unsettled state of finances European loans were negotiated with ease, both national and provincial, because the country is so prosperous, immigration larger than ever, and railroads being pushed with vigor. In two years the railway across the Andes will connect the Republic with Chili. Shipments were \$3,984,190, against \$5,258,414.

The Chilean Congress opened on June 1, and in President Santa Maria's message it was announced that the debt had been reduced \$12,000,000, and paper money \$1,600,000. The budget for 1887 estimates the income at \$35,000,000, and the outlay at \$32,000,000. The message puts on record material and educational progress to a remarkable degree during a single twelve-month. The low price of copper and wheat is about the only drawback chronicled. Shipments, \$2,090,100, against \$2,579,078. In Peru President Caceres has been installed in office, and the promises and steps traced out in his programme bid fair to give the ruined country a long spell of recuperation and regeneration. American capital has a good foothold there to be benefited by the expected favorable change. We shipped to Peru \$716,001, against \$1,061,823. Bolivia is also in the path of advancement; large silver production and the building of a road to connect the Republic with the Argentine Republic at short notice, will enable Bolivia to receive goods both from the Atlantic and Pacific through the medium of her two neighbors. Shipments to Ecuador and Bolivia combined were, \$523,460, against \$605,769.

In summing up the picture we have drawn it will be seen that the state of affairs in South America after years of great trouble is now a decidedly encouraging one, and, as what we have to sell the people there is cheaper than at any previous time we remember, we ought to do a large business this year with all of them. Last year, as we have shown, was in point of values behind 1884, but in bulk it must have been fully up to it.

## Condition of the Blast Furnaces of the United States July 1, 1886.

The returns received from the furnaces in the United States, showing their status on the 1st of the current month, do not reveal any striking changes. Comparing the furnaces using anthracite coal as the principal fuel, we find that while on May 1 there were 119 furnaces in blast, capable of producing 36,924 tons of pig iron per week, there were on June 1 121 furnaces with a weekly capacity of 38,239 tons, and on July 1 117 furnaces whose weekly capacity is rated at 36,762 tons, based upon their actual output during the past few months. In New York only minor changes have taken place during June, the June output being estimated at 16,107 gross tons, as against 14,479 tons in May and 14,479 tons in April. In New Jersey the Chester Furnace blew out on the 17th and the Pequest Furnace on the 22d. This did not affect the June yield very much, that having been 12,103 tons, as against 12,486 tons in May and 12,244 tons in April. The July make is, of course, expected to show a considerable decline, however, the present capacity being 2313 tons, as against 2850 a month since. We may note that the Franklin Furnace has been using coke lately. The Spiegel furnace of the Passaic Zinc Co. will blow in in a few days. In the Schuylkill Valley the Edge Hill Furnace has only been in a few days. The Lucinda is reported to be getting ready to go into blast. We estimate the June product at 29,361 tons, against 27,331 tons in May and 24,559 tons in April. In the Lehigh Valley the same number of furnaces are blowing, the aggregate June output being about 47,766 tons, as compared with 47,320 in May and 47,441 tons in April. In the Upper Susquehanna District No. 2 Glamorgan Furnace went in on June 19. The Chulasky Furnace was out for two weeks. The June output of the district was 14,840 tons, as compared with 13,348 tons in May and 12,721 tons in April. In the Lower Susquehanna district two of the Cornwall furnaces have been blown out, and one of the five furnaces of the Pennsylvania Steel Co. is temporarily idle. No. 1 Paxton is being rebuilt, and No. 2 is out for remodeling. It is expected that it will go into



blast on the 15th of this month. It will then have a capacity of 450 tons weekly. We estimate the June product of this district at 36,925 tons, as compared with 39,494 tons in April and about 40,000 tons in May.

Adding the product of the one furnace in Maryland we reach a total for the anthracite furnaces of 161,281 tons for June. This carries the make for the quarter—April, May and June—to 468,525 gross tons. The product for the first half of the year 1885 was only 627,872 gross tons, and of the second half 670,690 tons, so that, estimating the make of the first quarter at 408,000 tons, from former capacity statistics, it is clearly evident that in making about 876,525 tons in the first six months, we are now turning out iron at a heavily increased rate. It may be stated, however, that much of the apparent reserve capacity cannot be made available at present prices. It embraces, of course, the usual number of furnaces really out of blast temporarily for repairs or alterations. There is not room, therefore, for any marked increase unless a larger number of furnaces turn to the use of a greater proportion of rich foreign ores.

On the first of July there were 132 coke and bituminous furnaces in blast, having an estimated weekly capacity of 71,266 gross tons, as compared with 129 furnaces and 70,766 tons capacity on June 1, and the same number, with 67,888 tons capacity, on May 1. In the Shenango Valley the Ella blew in on the 15th of June. Among the furnaces which have made a good record recently is that of Messrs. Raney & Berger, which in May made 3534 tons and in June, in 26 days, 3354 gross tons. The total June output of the district was about 31,659 gross tons, as compared with 28,916 tons in May and 30,135 tons in April. In the Juniata and Conemaugh valleys the same number of furnaces are blowing. The aggregate June make may be placed at 23,361 tons, as compared with 23,581 tons in May and 23,547 tons in April. In the Youghiogheny Valley the Lemont Furnace has blown out, thus reducing the number of active furnaces temporarily to three. In the Pittsburgh district Lucy No. 1 and Isabella No. 2, which were out for the purpose of relining and for other repairs, have blown in again. The fires were lighted in the Edith Furnace several days ago, and it will blow in shortly. Then every furnace in Allegheny County will be in blast with the exception of one of the Shoenberger furnaces.

In Ohio we have in the Mahoning Valley the same furnaces blowing, and the output was 30,734 tons in June, as compared with 31,533 tons in May and 29,785 tons in April. In the Hocking Valley the Gore Furnace has again gone into blast, after having put up a new casthouse, and the Fannie, which was in operation only one week during the month, blew in again on the 30th ult. The June output was about 8832 tons, including the Franklin and the Zanesville furnaces, as compared to 8310 tons in May. In the Hanging Rock region there have been few changes.

From our returns we estimate the total make of the bituminous and coke furnaces of Pennsylvania at 118,509 tons in June, as compared with 111,221 tons in May and 108,323 tons in April. In Ohio the stacks in blast in June produced about 69,355 tons, against 72,875 tons in May and 73,834 tons in April. In Illinois the same furnaces were running, and the same is true of Indiana, Missouri and Wisconsin.

In the Southern States, one of the furnaces in Virginia, the Lynchburg, went out on the 13th for repairs. The Princess, which was out of blast on the 1st, has probably blown in again as we write. We estimate the June product at 10,797 tons, against 10,496 tons in May. In West Virginia there have been no changes, the June output being 9585 tons, against 9456 tons in May. In Kentucky the same three furnaces are running. They produced a little more in June than in May, viz., 4073 tons, against 3889 tons. In Tennessee seven out of the 10 furnaces made 9117 tons. One of the Rockwood stacks was banked during a part of the month, and a number of the other plants have not produced up to full capacity during the month. The May product was 11,983 tons. In Alabama one of the Sloss furnaces has gone out for the purpose of changing its lines to conform with those of No. 2, which has been eminently successful. The product during the month was about 12,000 tons, against 14,935 tons in May.

The charcoal furnaces show little change. In Maryland the Muirkirk Furnace is out and will probably remain in that condition during the balance of the year. The Stickney Furnace was banked temporarily on the 20th of June. In Virginia the Walton went in on the 14th, and after it has completed its run the White Rock Furnace will blow in. In Michigan the Eureka began to make pig iron on the 20th. We estimate the yield of all the Michigan furnaces in June at 13,892 gross tons. In Wisconsin the Appleton, Mayville and National made together 2288 tons. In Missouri two furnaces produced 1913 tons.

The Railway Age, of Chicago, has issued its usual semi-annual statement on the railroad construction during the first six months of the current year. This compilation, evidently made with much care, places the new mileage on 97 different roads at 1755 miles. It should be specially noted that generally only about one-third of the mileage of the entire year is completed during

the first half of the year. Last year, when 3200 miles were laid, the extension of track reported to the 1st of July was a little more than one-half of that put down this year. Our contemporary feels justified on the strength of its returns to predict that the total extension of our railroad network in 1886 will not fall short of 6000 miles, "and may considerably exceed that." The Railroad Gazette, which weekly publishes a record of new railroad construction, has the following comparative figures in its last issue, to which we have added the annual additions of mileage, according to Poor:

	Six months.	Year.
1885.....	1,375	3,300
1884.....	1,284	3,825
1883.....	1,218	4,753
1882.....	1,109	5,415
1881.....	1,415	5,381
1880.....	2,381	7,789
1879.....	2,190	7,174

These figures do not indicate quite so heavy an increase, unless indeed fully 400 miles this year escaped the attention of the Railroad Gazette. We must leave our two contemporaries to settle that question, content to know that, so far as indications go, our iron and steel works will be called upon to deal with the furnishing of supplies for about 6000 miles of new road during the current year. A good deal of this, notably so far as steel rails and track materials are concerned, is already contracted for and largely delivered. But a good deal of the rolling stock and other supplies has not yet been bought, and the next month or two will probably bring out much of it. The first indications of this movement have lately come from the West, and are a promising feature for the near future.

It is not surprising that the Ways and Means Committee have reported adversely on the tariff bill introduced by Mr. Randall, but it is to be regretted that this disapproval extends to all the provisions and includes the desirable features of Mr. Hewitt's bill to reform the administration of the customs laws. The only chance now offered of securing the consideration of Mr. Hewitt's bill is in his obtaining unanimous consent for its consideration as a separate measure, which it is doubtful if he will obtain. The same result could be reached by calling up the Morrison bill, and moving to strike out everything except the administration clauses. This, however, presents serious difficulties, and it is probable that tariff legislation, good or bad, is at an end for this session.

#### The Dephosphorization of Iron in the Bessemer Converter.

To the Editor of The Iron Age: A short time ago The Iron Age published the results had at Creusot from the use of fluor spar for the dephosphorization of iron in the Bessemer converter, which were successful when the iron was high in silicon, but when it contained from 0.60 to 1 per cent. of silicon it was difficult to use, owing to the formation of skulls. The reason then given for this fact was that the phosphorus was oxidized or burnt before the carbon, and its heat lost by so doing. This is easily proved to be a mistake, as phosphorus in burning evolves 5.747 units of heat per pound when burned with air, and the heat with that of the silicon would be more than that in the acid process when pig containing 1.75 per cent. of silicon is used.

The facts are that with pig iron in acid process containing 1.75 per cent. of silicon, yielding 39 pounds of silicon per ton of iron, each pound of silicon in combustion with air gives 7830 heat-units, or 306,370 heat-units per ton. As this is the lowest normal condition of iron used in the acid process except when it also contains manganese, it follows that in order to obtain this heat means must be used to secure it in any other process when the carbon is the same in either case. The Creusot metal averaged 0.80 per cent. of silicon, of which only one-half was oxidized, yielding 9 pounds of silicon or 20 pounds of silica, which, at 7830 units of heat per pound of silicon, gives 70,470 heat-units. The report says that 80 pounds of fluorspar sufficed for the operation, the resulting metal containing 0.052 per cent. of phosphorus and the slag 18 per cent. of phosphoric acid, the phosphorus in the pig being 2.3 per cent., or about 50 pounds per ton of iron. The other half of the silicon was converted to fluoride of silicon, which does not add to the heat of the metal, so that 9 pounds of the silicon were oxidizable and thus contribute to the heat of the metal. This thus becomes 20 pounds of silica, and the 80 pounds of fluorspar are converted to 58 pounds of lime. Any metallurgist will see that only about 120 pounds of slag are formed, including the phosphoric acid, which is equal to 10 pounds of phosphorus at 18 per cent. of phosphoric acid. This 10 pounds of phosphorus in oxidizing at 5747 units of heat per pound yield then 57,470 heat-units, and the heat-units of 9 pounds of silicon give 70,470 heat-units, the aggregate being 127,940 heat-units, or 170,430 heat-units less than is required in the acid process, wherein no phosphorus is oxidized. Therefore, in order to make up this deficiency of heat about 22 pounds of silicon per ton of iron more are required to make the iron hot enough to pour without skulls. This is confirmed by the Creusot experience with iron rich in silicon.

I patented the process of using more silicon treated by blasts of air in the converter lined with a basic lining to desilicize the iron, and pouring off the silicious slags formed thereby, and then treating the metal with fluorspar to remove the phosphorus. By this means all of the silicon is oxidized and used for heat, so that metal with less silicon than is required in the acid process may be used. Thus iron containing 1.4 per cent. will be suitable. As but 10 pounds of phosphorus are found in the slags per ton of iron, the remainder, exclusive of that left in the steel—about 1 pound—say 39 pounds, has been vaporized, as there is no

## Condition of the Blast Furnaces of the United States, July 1, 1886.

Compiled for The Iron Age.

Location of Furnaces.	Charcoal.				Anthracite.				Bituminous or Coke.			
	Total number of stacks.	Number reported in blast.	Capacity per week.	Number reported out of blast.	Total number of stacks.	Number reported in blast.	Capacity per week.	Number reported out of blast.	Total number of stacks.	Number reported in blast.	Capacity per week.	Number reported out of blast.
New England.....	14	6	610	8	326							
New York.....	10	3	450	7	570	34	13	3,875	21	5,885		
New Jersey.....						16	5	2,313	11	3,162		
Pennsylvania.....	27	9	457	18	418	3	2	135	1	90		
Lehigh Valley.....						50	37	11,144	13	2,672		
Spiegel.....						1	1	40	0	0		
Schuylkill Valley.....						45	22	6,851	23	4,975	1*	775
Upper Susquehanna Valley.....						20	13	3,486	7	1,350		
Lower Susquehanna Valley.....						38	23	8,618	15	2,235		
Pittsburgh.....											16	14
Spiegel.....											13,875	2
Allegheny Valley.....											1	450
Shenango Valley.....											2	1
Youghiogheny Valley.....											23	14
Juniata and Conemaugh Valleys.....											7,785	9
Spiegel.....											6	3
Maryland.....	13	2	230	11	647	4	1	300	3	440	20	13
Virginia.....	24	3	147	21	970						5,451	7
North Carolina.....	2	1	120	1	190						1	250
West Virginia.....	3	0	0	3	165						2	1
Ohio—Mahoning Valley.....											13	5
Central, Eastern and Northern.....											2,482	8
Hocking Valley.....											6	4
Hanging Rock.....	17	0	528	11	685						2,655	2
Miscellaneous.....	1	0	0	1	280						7,139	5
Kentucky.....	3	2	235	1	125						17	11
Tennessee.....											5,425	6
Georgia.....	2	0	0	2	150						8	2,090
Alabama.....	11	8	2,100	3	375						15	9
Indiana.....											3	3
Illinois.....	25	13	3,441	12	2,275						9	951
Michigan.....	10	4	706	6	532						10	7
Wisconsin.....	1	0	0	1	210						2	2
Minnesota.....	4	2	446	2	463						2	2
Missouri.....	2	1	230	1	110						16	9
Texas.....	1	0	0	1	245						2	0
California.....	1	1	185	0	0						2	0
Washington Territory.....	1	0	0	1	100						7	3
Oregon.....											1	1
Colorado.....											7	3
Total July 1.....	172	61	9,885	111	8,536	211	117	36,762	64	20,869	212	132
Total June 1.....	174	61	9,867	113	9,154	207	121	38,230	86	18,949	212	129
Total May 1.....	185	45	8,211	139	12,701	208	119	36,924	89	19,565	212	129

\* One-half anthracite.

other way of accounting for its absence. The phosphorus that goes off as vapor is free of silicon compounds, and has combined with the fluorine of the fluorspar, which is totally absent from the slags. This fluorine compound readily condenses in cold water to hydrofluoric acid and phosphorus. It is intended to add a conduit to the hoods of the Bessemer converters and conduct these gases to a combined spray and dip condenser, using water at 35° F, to condense the gases to phosphorus and hydrofluoric acid. The phosphorus will be separated by draining the acid away, and the acid afterward treated with milk-lime to form an artificial fluoride of calcium for use again.

It is thus seen that in this application of the basic process iron lower in silicon than is necessary for the acid process may be used, which metal is of every-day production at most of the furnaces in the United States. But when it is more desirable to make the pig iron with lower silicon the required heat may be obtained by pumping petroleum into the air blast, 1 gallon being the equivalent of 0.45 per cent. of silicon in 1 ton of iron; 420 cubic feet of water gas are the equivalent of 1 gallon of petroleum for this purpose, or 1600 cubic feet of producer gas made with air.

JAMES HENDERSON.  
NEW YORK, July 1, 1886.

#### WASHINGTON NEWS.

(From Our Regular Correspondent.)

WASHINGTON, D. C., July 5, 1886.

A majority of the Committee on Ways and Means, headed by their chairman, have been decidedly adverse to permitting any action, even to the extent of an adverse report, to be taken upon the Randall tariff bill. Public sentiment in different parts of the South and West, however, has of late been making itself heard, and as a consequence a more tolerant feeling has been shown in the committee. It is now proposed to report the bill adversely, and give the minority a chance to present their views. The bill will then go on the calendar, leaving the House to shoulder any further responsibility in the premises. The committee admit that to hold it there would be treated as a usurpation of power which they care not to face, and that an adverse report would answer every purpose.

#### PROPOSED ACTION ON THE RANDALL BILL.

In accordance with this arrangement there are some who favor taking a vote on going into committee of the whole on consideration in order to make an issue on tariff revision, about which both parties have had so much to say, to see where they stand. If no further steps were taken than the recording of this vote it would be interesting as showing how far party discipline would hold their members. There are features in the Randall bill which meet with much approval among the protectionists, and are not disapproved by the more moderate Democratic advocates of low duties. It would be a singular state of things to find a fusion of votes on a measure somewhat in the line of the theory of the Randall bill. It is not probable that any attempt would be made to pass the bill even if it should reach the committee of the whole on account of the disposition to adjourn as soon as possible. A few speeches might be made outlining the views of the leaders on the tariff question, which

might answer for campaign purposes, but nothing further could be expected without protracting the session far into August. Within the next few days it may be possible to form an opinion on the attitude of the question in the House of Representatives.

#### FEATURES OF THE RANDALL BILL.

There is no difference of opinion among the Democratic colleagues of Mr. Randall who co-operated in the defeat of the Morrison bill as to the measure which the former submitted a week ago formulating the incidental protective tariff Democratic idea. The whole theory, as they claim, is the protection of American labor, and through that American industry. There is something in the idea as exemplified in some parts of the Randall bill. The free list, which in the first Morrison bill was a sweeping effort to annihilate the lumber, mining and factory and other smaller interests, and in the second a modification as to iron ore, in the Randall bill confines itself to rough lumber as a protection of American forests, but keeps a duty on manufactured lumber as a protection of American labor. Iron ore and fisheries are left as they are. In the metal schedule the author of the bill claims that the changes in the direction of lower duties on iron and steel, and steel and part steel railway bars to \$13 a ton for rails, and flat rails to \$16 per ton; fish-plates, 1½ cents to 1 cent per pound; horseshoe nails, from 4 to 3 cents per pound; beams and girders, from 1½ to 1 cent per pound; steel wheels, 2½ to 2 cents per pound; ingots for railway wheels, from 2 to 1½ cents per pound, &c., are an equalization of duties proportionately to the schedules on other articles. For instance, the ad valorem equivalent on fish-plates in the present tariff is 116.84 per cent., and proposed 87.63 per cent. On horseshoe nails, 100.61 per cent.; proposed, 80.49 per cent. Ingots for railway wheels, 101.48 per cent. at present, and 76.11 per cent. proposed; while on boiler and other plate iron the present ad valorem equivalent is 16.93 per cent. and is not changed.

#### TIN PLATE.

On tin plate, in raising the duty from 1 cent to 2½ cents per pound the ad valorem equivalent of 30.44 per cent. is raised to 68.49 per cent. Tapers iron is also raised from 30 per cent. to 1½ cents per pound, or 51.30 per cent. Cotton ties, about which so much litigation has been had, are raised from 35 per cent. to 1 cent a pound, or 35 to 60 per cent. equivalent. It is claimed for this increase of duty on the articles named that the present rate practically excludes their manufacture in this country, and that as a consequence on tin plate alone nearly \$20,000,000 are spent out of the country for a single article which could as well be manufactured here. In cotton ties the under-valuation resorted to by shippers and importers have practically brought the duty down to ½ cent per pound. Manufacturers admit, with the law vigorously enforced, they can manufacture the article. While the equalization by means of lower duties on certain articles is not admitted by the framers of the bill as tending necessarily to a lowering of wages of labor on account, as they state it, of the margin of profit, the increase on the other articles named is regarded as both a protection of American labor and a broadening of the field of labor by increasing the value

of the market by a demand for about \$35,000,000 of articles not now manufactured in the United States.

#### OTHER PROVISIONS OF THE BILL.

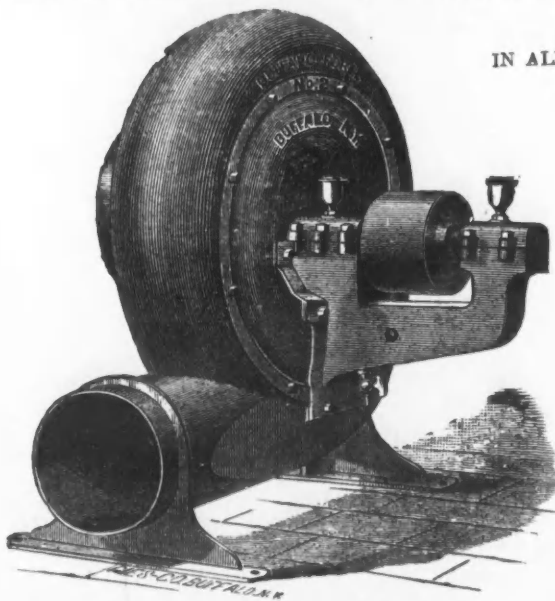
In the other provisions of the bill the duties have been changed largely to prevent undervaluation, as on lace embroideries, gloves, &c., fruits, chemicals, &c. As a protection of sewing men and women ready-made clothing is made dutiable at 10 per cent. more than the cloth, now the same. Animals for breeding are made dutiable with other live animals, the privileges of the law having been found to lead to frauds on the revenue, particularly in Canadian and Mexican wool growers driving their sheep with the fleeces on across the border ostensibly for breeding purposes, but really to evade the duty on the fleeces, thus getting it in free. After shearing the sheep are driven back over the borders. It will thus be seen that the bill, while objectionable to some people in some respects, is commendable to others as a step in the direction of a rational tariff revision. While the reduction in the bill from customs duties is but \$8,000,000, the repeal of certain internal revenue duties brings the revenue down \$26,000,000, or a total of nearly \$34,000,000 a year.

#### Effects of Magnetizing Iron Bars.

It has long been known that when an iron rod is magnetized its length in general is slightly increased. Some experiments on this effect of magnetization, an account of which has been given in two papers recently communicated to the Royal Society, show that if the magnetization is carried beyond the point at which the magnetic elongation of the rod reaches a maximum the length of the rod, instead of remaining unchanged, steadily diminishes, the curve expressing the relation between the length and the magnetizing force descending in a perfectly straight line, which within the limit of the experiments shows no tendency to become horizontal. Some further experiments, not yet published, have also been made with rings of iron, instead of rods, and effects of precisely the same character were obtained. The diameter of a ring was found to be increased by a comparatively small magnetizing current, and diminished by a strong one. The retraction in question does not begin to occur until after the stage of magnetization, loosely called the "saturation point," has been passed, when, according to the common belief, the magnetization of the iron has practically reached a limit, and is not sensibly affected by any further increase of the magnetic force, and hence arises a difficulty in accounting for the phenomenon. The most obvious method of explaining the retraction is to assume that under the influence of increasing currents the magnetic attraction of the particles of the iron toward one another is increased, and thus the rod becomes compressed. But this cannot be the case if the magnetic condition of the iron has become constant and independent of the magnetizing current. And a similar objection will apply to any hypothesis which assumes, as perhaps all must, that some property of the iron dependent upon its magnetic condition varies in a sensible degree with the magnetizing force after the saturation point has been passed.



## NEW AND IMPROVED Buffalo Exhausters,



IN ALL THEIR VARIETY,

For Planing

Mills,

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Purposes, &amp;c.

Superior to any  
other make.

**BUFFALO FORGE COMPANY,**  
BUFFALO, N. Y.



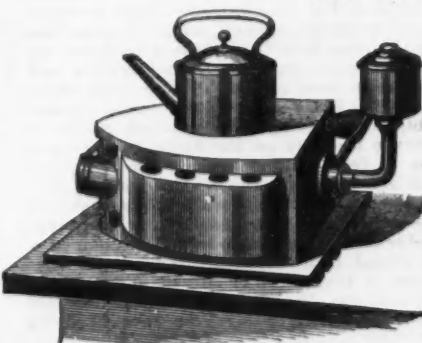
PENFIELD BLOCK CO.,  
Lockport, N. Y.

Have found that the greatest objection to Block Sheaves bushed with their PHOSPHOR-BRONZE Self-Lubricating Bushing is that they are spoiling their repair trade. You know, in a great measure, the Bushing is the life of the Block.

**FOX SAD-IRON CO.,**

78 MAIDEN LANE,  
NEW YORK.

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Our Iron does away with Hot Kitchens.

Being reversible, one Iron does the work of an entire set (one side heats while the other is in use). It combines first-class Fluter and Polisher, also makes the best little Cooking Stove for a sick-room, &c., ever invented. Can be used with either Gas or Alcohol. Very simple and absolutely safe in handling.

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— MANUFACTURERS OF —

Chace's Machine, Sewing Machine, Paragon, Engineers', Dripping and Bicycle

## OILERS,

Oil Spouts, Sprinkler Heads, Engineers' Sets, Can, Coffee and Bottle, Flask and Shipping Can Screws, and all other Regular and Special Goods in Spun or Stamped Ware.

All kinds of SHEET METAL GOODS made to order.

We have the largest and best facilities for furnishing the best quality of work and promptly.

Correspondence solicited. Write for Catalogue.

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**J. E. QUACKENBUSH & SON,**

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Send for Price List and Terms.

OFFICE  
825 West 4th St., N. Y.



**GUN POWDER.**

**LAFLIN & RAND POWDER CO.,**

No. 29 Murray Street, New York.

Manufacture and sell the following celebrated brands of Sporting powder, known everywhere as

Orange Lightning, Orange Ducking,  
Orange Rifle,

more popular than any Powder now in use.

BLASTING POWDER and ELECTRICAL BLASTING APPARATUS. MILITARY POWDER on hand and made to order

Safety Fuse, Frictional and Platinum Fuses.

Pamphlets showing sizes of grain sent free.

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Cable Address, "Pike, Haverhill."

MANUFACTURERS AND WHOLESALERS IN

**BLUE STONE.**

The Largest Manufacturers and Dealers in Stones for Sharpening all Edge Tools.

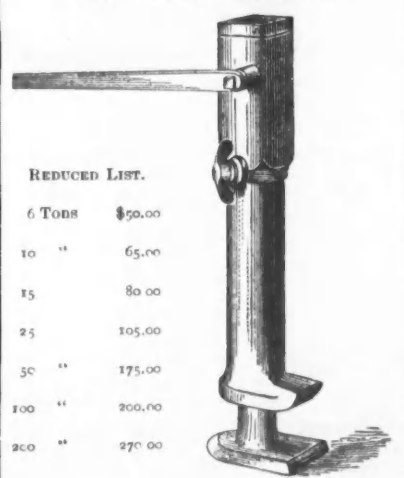
Pike's celebrated Blue Stone, Indian Pond (Red End), Lamotte, Black Diamond, Magic Green Mountain. All kinds branded with our name are genuine.

Also Oil, Water and Dry Wheelstones; Arkansas Washite, Turkey, Hindustan and Sandstone Razor Stones Vienna Cigar shape

In fact, everything that is used for sharpening Edge Tools supplied in any grit or shape required. Quality and Prices guaranteed. Send in your orders.



TANGYE'S PATENT  
Hydraulic Lifting Jacks.  
Cheapest Jack in the Market.



REDUCED LIST.

6 Tons	\$50.00
10 "	65.00
15 "	80.00
25 "	105.00
30 "	175.00
100 "	200.00
200 "	270.00

Send for list of other sizes and discounts. Makers of Hydraulic Punching Bears, Girder Testers, Rail Benders, &c.

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26 Warren Street, N. Y.

**OHIO CLIP WORKS,**  
Westville, Ohio,

Sole Manufacturers of the

**"BAKER" CLIP,**

For Singletrees, Heavy Axles etc. "Baker" Lap Links, "Baker" Oval Lap Rings, Ferrules and Hooks, Neck Yoke Irons, etc. Best Goods Made, Ask for them where you buy your Hardware, or send for Price List

**SOLID  
STEEL  
BLADES.**



Adjustable  
**HANDLES.**

Wheeler, Madden & Clemson Mfg. Co.,  
MIDDLETOWN, N. Y.

Pat. Sept. 8, 1885.

**VIRGINIA NAIL AND IRON WORKS COMPANY,**  
LYNCHBURGH VIRGINIA.

**NAILS and Bar Iron of Superior Finish, made exclusively from Pig Iron.**

PATENTED ARTICLES  
OF  
**MALLEABLE IRON.**  
Hammer's Adjustable Clamps.



Hammer's Malleable Iron Oilers, 3 Sizes.  
Malleable Iron Hand Lamps.  
Malleable Iron Hanging Lamps.

**NEW** pattern Heavy Screw Clamps.  
Strongest in the market.  
For sale by all the principal Hardware dealers.  
Send for Price List.

**MALLEABLE IRON CASTINGS**  
of superior quality and Hardware Specialties  
in Malleable Iron made to order.

**HAMMER & CO.,**  
Branford, Conn.



**WM. MANN, JR.,  
& CO.,**

LEWISTOWN, PA.,

Manufacturers of

**RED WARRIOR**

**AXES,**

BROAD AXES,

Adzes,

Broad Hatchets,

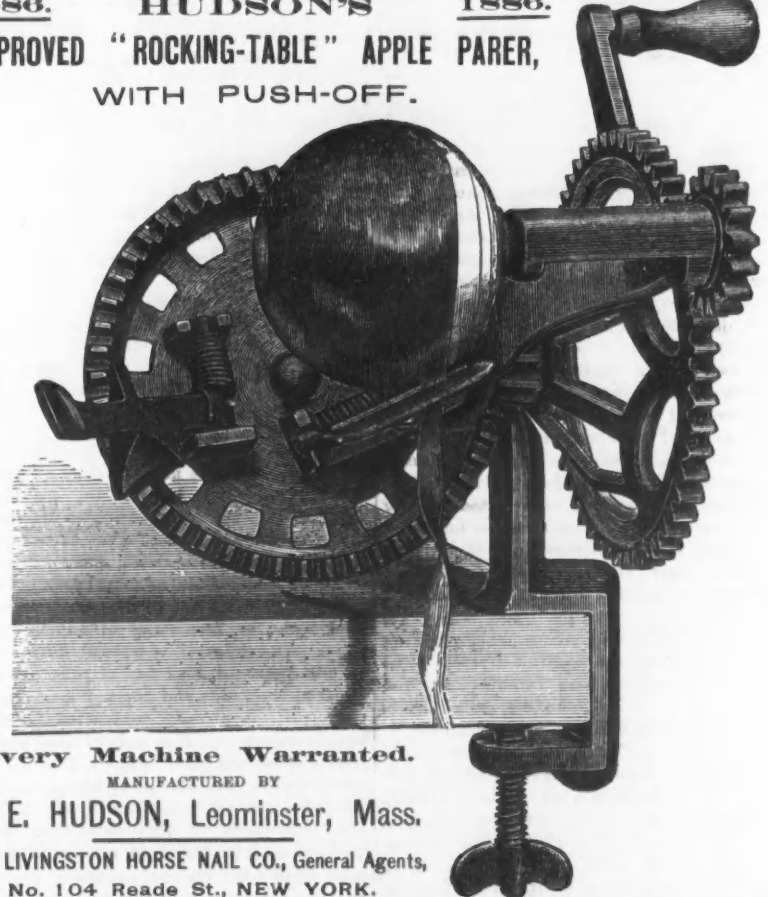
Spanish Axes

and Tools.

**Samuel Martin,**  
MANUFACTURER OF  
**Theatrical Hardware,**  
127 Eighth Avenue, New York.

**The T. H. Bullock**  
The Best for the Money.  
**BELLOWS** Cleveland, Ohio. **FORGES**

1886. **HUDSON'S** 1886.  
IMPROVED "ROCKING-TABLE" APPLE PARER,  
WITH PUSH-OFF.



Every Machine Warranted.

MANUFACTURED BY

**C. E. HUDSON,** Leominster, Mass.

THE LIVINGSTON HORSE NAIL CO., General Agents,

No. 104 Reade St., NEW YORK.

**MERIDEN MALLEABLE IRON CO.,**  
MERIDEN, CONN.,  
Manufacturers of a Full Line of the Latest Improved  
**Patent Adjustable Iron Planes.**

THE BEST NOW IN THE MARKET.

Send for Full Descriptive Catalogue.

New York Office, 37 Barclay St. Boston Office, 147 Franklin St.



**WOOD ENGRAVING**  
ELECTROTYPING  
PRINTED SUPPLIES

Manufacturers,  
Wood Engraving,  
Electrotyping  
and Printing.  
Publisher of The Manufacturers' Exchange.

**A. MUGFORD,** Hartford, Conn.

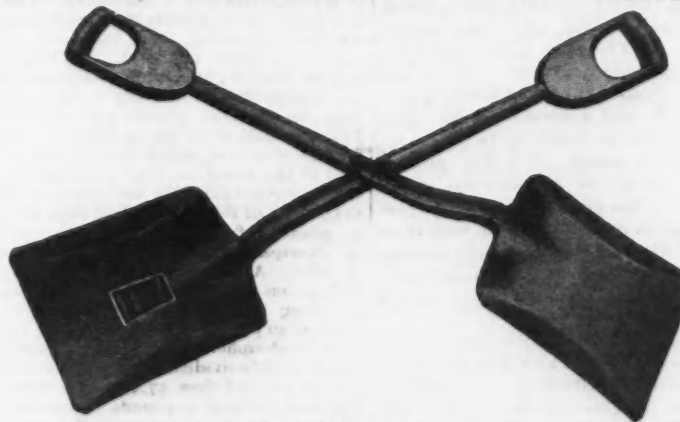
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A book of 100 pages. The best book for an advertiser to consult, be he experienced or otherwise. It contains lists of newspapers and estimates of the cost of advertising. The advertiser who wants to spend one dollar finds in it the information he requires, while for him who will invest one hundred thousand dollars in advertising a scheme is indicated which will meet his every requirement, or can be made to do so by slight changes easily arrived at by correspondence. One hundred and fifty three editions have been issued. Sent postpaid, to any address for 10 cents. Apply to GEO. F. ROWELL & CO., NEWSPAPER ADVERTISING BUREAU, 10 Spruce St. (Printing House Sq.), New York.

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**Pittsburgh, Pa.,**

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Railroad, Contractors' and Miners'



Also a full line of  
**SHOVELS, SPADES and SCOOPS**  
for the  
**HARDWARE TRADE.**

**COMMON SENSE POST HOLE DIGGERS,  
COLD CHISELS, PUNCHES,  
WOOD, COAL and STONE  
WEDGES.**

Prices quoted on application.

**J. C. McCARTY & CO.,** Direct Representatives,  
97 CHAMBERS ST., NEW YORK.



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Adjustable Covers

Adjustable Covers

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## Special Notices.

## BOOKS.

## THE NEWEST BOOKS.

British Iron Trade Report on the Home and Foreign Iron and Steel Industries in 1885. By J. H. SHEPARD. \$1.75

Oils and Varnishes. By JAMES CAMERON. \$1.75

Elements of Inorganic Chemistry, Descriptive and Qualitative. By J. H. SHEPARD. \$1.25

Flax, Tow and Jute Spinning; A Handbook Containing Information on the Various Branches of These Trades; second edition. By P. SHARP. \$1.25

Treatise on Statics, with Applications to Physics: third edition, corrected and enlarged. By G. M. MINCHIN. \$1.25

Practical Hydraulics; a Series of Rules and Tables for the Use of Engineers. 7th Edition. By THOMAS BOX. \$1.25

A Handbook on the Teeth of Gears; Treating of the Form of the Gear Tooth; Explaining the Different Curves in use. Their Theory, Their Properties, Mode of Operation, Strength and Horse Power and Practical Construction. By G. D. GRANT. \$1.25

The Bridle Bits; A Treatise on Practical Horsemanship. By Col. J. C. BATTERBY. \$1.25

The American Salmon Fisherman; With Illustrations and Map showing Location of Salmon Rivers. By H. P. WELLS. \$1.25

The Labor Problem; Plain Questions and Practical Answers. Edited by W. E. BARNES. A Compilation of Articles Containing the Views of Manufacturers, Workmen, Lawyers, Labor Commissioners, Journalists and others. \$1.25

Modern Cottages; Contains 125 illustrations of Cottages, Dwellings, a Miscellaneous Work. By J. H. KIRBY. \$1.25

The Indicator; A Practical Work for Steam Engineers. By F. T. HEMMENWAY. \$1.25

Warm-Blast Apparatus for Transferring a Part of the Heat of Escaping Flue Gases to the Furnace. By J. C. HODLEY. \$1.50

Any Book Published will be sent, postpaid, to any address on receipt of price by

DAVID WILLIAMS, Publisher and Bookseller,

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An Unusual Opportunity for a Good Business Manager.

A party having the general management of a large Iron and Wood working establishment located in the Northwest desires to sell a portion of his interest in said corporation to a man qualified to fill his position; only a man of successful business experience need apply. Special qualifications needed are in manufacturing line, as selling department is well handled. Business is well protected by patents. Anywhere from \$50,000 to \$100,000 can be invested in stock that has paid 20% per annum on the average for past nine or ten years. The health of owner is the reason for selling. Business very snug; no long credits.

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Office of The Iron Age, 66 and 68 Duane Street, N. Y.

Forty-Two Inch Lathe

AT A LOW PRICE.

Having purchased at a low price, from a well-known builder of Machine Tools, a lot of Patterns and Tools partly finished, we are enabled to offer a FORTY-TWO INCH by EIGHTEEN FEET TREBLE-GEARED LATHE at a figure considerably less than it would cost to build it.

It is the only one we shall have to offer at this figure. It is of excellent design, strong and well proportioned.

THE

NEWARK MACHINE TOOL WORKS,

NEWARK, N. J.

SECOND HAND,

CHEAP.

One 18 ft. bed, 42 in. Engine Lathe.

One 17 ft. bed, 30 in. Engine Lathe.

One 16 ft. bed, 25 in. Engine Lathe.

One 6 ft. bed, 18 in. Windsor Lathe and Chuck fitted.

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One Profiling Machine.

One No. 1 Brown & Sharpe Screw Machine.

One 2-spindle Pratt & Whitney Drill.

One 2-spindle Garvin Drill.

One Putnam Machine Co. Milling Machine. Lincoln Pattern.

One 2-in. Pipe Threading and Cutting Machine.

Send for List of Second Hand Tools.

New York Machinery Depot,

Bridge Store No. 16, on Frankfort St.,

NEW YORK.

FOR SALE.

1600 lb. 3/4 in. x 1 1/2 in. Cant Hook Steel.

1400 lb. 1 1/2 in. x 1 1/2 in.

Lot left after finishing a contract. Will sell low.

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A first class manufacturing property completely equipped for the manufacture of either metal or woodwork, with a natural gas well but a few hundred feet away. The property is located on one of the great trunk line railroads, and adjoining the freight depot, so that no carting of either supplies or finished goods is necessary. For further particulars, please address

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WANTED.

A young, active man, experienced in Builders' Hardware, as a Partner in an old established house in Chicago. Capital required for a one-third interest, \$12,000. Address, with full information as to present and former engagements, in strict confidence, "LOCKER,"

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Lots of acre property on river and railroad, connecting with the B. & O., Chicago & Atlantic, Chicago & E. Illinois, Chicago, R. I. & P., Chicago & W. Indiana, and Belt Line, Ill. Cent., L. S. & Mich. So., L. N. Albany & Chicago, Mich. Cent., N. Y., Chicago & St. Louis and P. Ft. W. & Chicago Railroads.

Number of passenger trains to and from Chicago to South Chicago daily is about 75 each way.

Also Docks on Calumet River, with its splendid harbor at South Chicago, and the only river property connecting with the Belt Line, which also connects with every R. R. entering Chicago.

Towage One-Half Chicago Rates.

Capital invested at this point alone, \$9,000,000.

In buildings and plants, 4,100,000.

Value of product last year, 9,000,000.

Lumber received last year, 105,000,000 Ft.

Among the many large establishments already located are the North Chicago Rolling Mill Co.'s Bessemer Steel Rail Mill, the Calumet Iron and Steel Co.'s Rolling Mill and Nail Manufactory, The Morden Frog and Crossing Works, Chicago Forge and Bolt Works, &c., &c.

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Contractors for River and Harbor Improvements, Dredging Dock and Pier Construction, Pile Foundations, etc. Estimates on application.

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METALLURGICAL ENGINEERING.

I am prepared to furnish

PLANS, SPECIFICATIONS and ESTIMATES

AND TO

SUPERINTEND THE CONSTRUCTION OF ROLLING MILLS AND MACHINERY, RE-

GENERATIVE GAS FURNACES,

TUBE AND PIPE MILLS,

ETC., ETC.

I represent the latest improvements in all the above branches.

M. V. SMITH, Metallurgical Engineer,

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Steam Pumps.

Special sale of second-hand, in perfect order, viz:

No. 5 Knowles, 7 in. steam, 4 in. water, 10 in. stroke, 3 in. suction; price \$125.

No. 1 Knowles, 5 1/2 in. x 2 in. x 5 in. ditto, 1 1/4 in. suction; \$60.

No. 8 Cameron, 7 in. x 5 1/2 in. x 10 in. ditto, 3/4 in. suction; \$100.

Worthington Duplex, 4 1/2 in. x 2 1/2 in. x 1 in.; \$50.

Columbus, 7 in. x 3 1/2 in. x 8 in., 2 1/4 in. suction; \$75.

And many others. New Pumps, best in use without exception. All sizes on hand or made to order. We buy, sell, exchange and rebuild all kinds of Pumps, or put our new Valve Gear on old pumps and warrant satisfaction. Write to

AMERICAN TOOL CO.,

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Wanted.

Practical Tap and Die Maker, soon as possible, for bolt shop. To No. 1 Mechanic permanence and good pay assured. Must be temperate. State experience and where. Reference wanted.

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950 pair new Rink Skates: Best on the market; retailed for \$3; will be sold in 100 pair lots, assorted sizes, 50 cents a pair; to close lot 42 cents a pair; full assortment of sizes, 300 pair new, full pickled, half-champ; sizes, 9 1/2, 10, 10 1/2, 11; to close price \$1; were retailed for \$5 per pair. Address P. O. BOX 1603,

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HARDWARE and STOVE BUSINESS

located near New York; established 1840; always profitable. \$5000 to \$10,000 cash required. Owner must retire.

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P. O. Box 3401,

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Bung-Porer, a new invention; the best thing out for the purpose; correspondence solicited.

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PROPOSALS WILL BE RECEIVED UNTIL

July 25th for 200 to 300 tanks Mixed Acid, 4 to 7; 50 to 75 tanks Yellow Distilled Glycerine; 300 to 400 bags of Nitrate of Soda; 100 to 150 bags of Wood Pulp. All goods guaranteed pure in every respect, and subject to rigid inspection, by a practical chemist. Purchaser will pay cash.

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WANTED—A Superintendent for a Wire Mill making Fine Wire and Cloth; one who thoroughly understands his business may address

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Office of The Iron Age, 66 and 68 Duane St., N. Y.

## Special Notices.

## FOR SALE.

## Damaged Band and Rod Iron.

For sale low, or in exchange for Scrap Iron or Scrap Steel.

DAN'L W. RICHARDS & CO.,

DEALERS IN

SCRAP IRON, SCRAP STEEL AND METALS,

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NEW YORK.

Manufacturing Sites

FOR SALE.—In Westmoreland County, Pa., on the Allegheny Valley R. R., 18 miles from Union Depot, Pittsburgh, in lots from 10 to 200 acres, having front 1/2 of a mile on Allegheny River on west, and same length of railway on the east; is level and mostly 20 feet above highest water, siting at various points, can connect at grade. Ten foot vein of coal under the whole tract. Both the Philadelphia and the Hite Companies' Gas Lines from Tarentum west front; Gas rises along all this front, and parties desiring to control their own fuel would do well to look at this item. Railroads centering at Pittsburgh have favorable rates for all points. Two large plate glass works and other industries using gas lie from one to two miles above, on the Tarentum side. Descriptive circular sent on application to

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Parnassus, Pa.

For Sale.

ROLLING MILL MACHINERY.

Engines, Shafts, Punches, &c. Can now be seen standing at mill, Philadelphia,

Iron and Steel Co., 235 North Delaware Avenue. Prices on application.

JOS. C. POULTER & CO.,

204 So. 3d Street, Philadelphia.

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HAYDOCK & BISSELL,

Wholesale Auctioneers.

By order of the CENTRAL MFG. CO., of Boston,

LARGE SPECIAL AND PEREMPTORY SALE

OF

4000 Cases

Swedes and American Tacks and Nails,

On Tuesday and Wednesday, July 13th and 14th,

at 10 o'clock a. m. each day.

At our Salerooms, 12 Murray St. and 15 Park Place, New York.

This sale will be made on 60 days' time for approved paper, for bills of \$250 and over; under \$250, net cash. Further particulars in next issue of The Iron Age.

For Sale.

A clean stock of Hardware in a live and growing Michigan town. Stock will invoice about \$5000. Satisfactory reasons given for selling.

Address "GENERAL HARDWARE,"

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FOR SALE.—An old and well-established Hardware business in one of the best locations in Kansas City, Mo. For further particulars, address

"NAILS," Box 22,

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NEW LOCATION WANTED

FOR MANUFACTURING.

A manufacturing concern, long and well established, desires to make a change from a small place with no railroad to some live town of 5000 or over. The line of goods is a very fine one, and sell to the Hardware Trade. About 100 of the best class of mechanics are employed, and the number can be largely increased. This is a rare chance for some good place to secure one of the finest branches of manufacturing. Correspondence is solicited, setting forth advantages, inducements, &c.

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PRICE BOOKS.

LARGE SIZE, 500 Pages, 6 x 9 1/2 in., each, \$4.00.

POCKET SIZE, 250 Pages, 4 x 7 in., each, \$4.00.

Send for Circulars.

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To Iron and Nail Mills.

I want agency for St. Louis and tributary trade, on commission, of a B. Bar and Sheet Mill; a C. C. Bar and Plate Mill; a Steel Plate Mill and a Nail Mill. Water transportation here preferred. Ten years' acquaintance with trade, and satisfactory references. Am here to stay, and want permanent agency.

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A Hardware Clerk who is competent to act as Salesman in a wholesale and retail Hardware Store. Reference required. Address, stating experience and also salary expected.

P. O. BOX 578,

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TWO LET, WITH POWER, one or more floors of a two story and basement brick building, 12 x 55 feet situated within seven minutes of freight depot and steamboat wharf.

Address P. O. BOX 578

Bridgeport, Conn.

OBSERVE!

A Mechanical Engineer and Draughtsman, competent practically and theoretically, desires an engagement in works or draughting room.

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## Special Notices.

Second-hand Machinery in Good Order. For Sale Cheap.

1 Engine Lathe, 48 in. x 20 ft. bed.

1 " " 36 in. x 18 ft. "

1 " " 24 in. x 15 ft. "

1 " " each 24 in. x 20 in. and 24 ft.

1 " " 24 in. x 12 ft. bed. Pinfield

1 " " 22 in. x 12 ft. "

1 " " 20 in. x 8 and 10 ft. bed. Putnam.

1 " " 18 in. x 9 ft. "

1 " " 15 in. x 8 ft. Porter. Rod feed only.

1 " " 14 in. x 6 ft. and 8 ft.

1 " " 12 in. x 4 ft. "

1 " " 10 in. x 3 ft. Wm. Sellers & Co.

1 " " 8 in. x 4 and 5 ft.

1 " " 17 in. x 17 in. x 3 1/2 ft.

1 " " 20 in. x 20 in. x 4 and 5 ft.

1 " " 30 in. x 30 in. x 7 ft.

1 " " 36 in. x 36 in. x 8 ft.

1 " " 24 in. x 24 in. x 5 and 6 ft.

1 " " each 42 in. x 42 in. and 5 and 10 ft.

1 Shaper, 10 in. stroke. Pratt & Whitney.

1 Shaper each 12, 15, 20 and 28 in. stroke.

1 Crank Planer.

1 12 in. B. G. & S. P. Drill.

1 each Upright Drill, 20 and 24 in., with Back Gears.

1 Index Miller. Pond.

1 each Nos. 1 and 2 Screw Machines. Wire Feed.

1 Pratt & Whitney's Traveling Head Shaper.

1 No. 3 Screw Machine. Plain. P. & W.

1 37 1/2 lb. Drop Hammer. Beecher & Peck

1 No. 20 H. P. Press.

1 10 Foot Presses, assorted.

8 Power

12 Punching and Shearing Machines, assorted.







# Trade Report.

## New York.

**American Pig.**—The principal sellers of Southern Irons report their furnaces well sold up for the next few months, and little or no business has been done by them during the past week. The reports of concessions on standard brands, given currency by some of our contemporaries, rest on a flimsy foundation. We have not been able to trace them to any reliable source. The market remains quiet and steady. We quote for standard brands, tidewater delivery, \$18 @ \$18.50 for No. 1 X Foundry, \$17 @ \$17.50 for No. 2 X Foundry, and \$16 @ \$16.50 for Gray Forge, with the market in buyers' favor. Outside brands are 50¢ below these quotations. We print our usual monthly statistical report elsewhere.

**Scotch Pig.**—The arrivals are light, and, with the exception of insignificant quantities, are sold previous to arrival. Firmer freights make importers indifferent sellers at present prices. We quote nominally as follows for small lots: Coltness, \$19.75 @ \$20 to arrive; Gartsherrie, \$19 @ \$19.25 to arrive; Shotts and Langloan, \$19.50 @ \$20 to arrive; Carnbroe and Glegarnock, \$18.50 @ \$19 to arrive; Summerlee, \$19.50 @ \$19.75 to arrive; Dalmellington, \$18.50 @ \$18.75 to arrive; Eglinton, \$17.50 @ \$18 to arrive, and Clyde, \$18 @ \$18.50 to arrive.

**Bessemer Pig.**—The market has been very quiet, no sales of Foreign or Domestic being reported. We quote Foreign nominally \$18.75 @ \$19, and Domestic \$18 @ \$18.50 at furnace.

**Spiegel Eisen.**—Aside from the sale of a small lot at a higher figure than our quotations, we hear of no business. We quote English, large lines, \$25 @ \$25.25, and German nominally \$25.

**Bar Iron.**—The market remains fairly steady. It is little influenced by the strike at the Philadelphia mills. We continue to quote for delivery here in round lots: Common Iron, 1.65¢ @ 1.70¢; Medium, 1.70¢ @ 1.75¢; and Refined Iron, 1.75¢ @ 1.80¢. Store prices are 1.75¢ @ 1.80¢ for Common, 1.85¢ @ 1.90¢ for Medium, and 1.90¢ @ 2.25¢ for Refined.

**Structural Iron and Steel.**—One or two considerable contracts have been awarded during the week. The market is quiet and steady. We quote for Angles 2¢ @ 2.10¢, delivered, and Tees at 2.40¢ @ 2.45¢, for round lots. Steel Angles are quoted 2.35¢ @ 2.45¢, according to quality. Store quotations remain 2.25¢ @ 2.4¢ for Angles, and 2.6¢ @ 2.7¢ for Tees. American Beams and Channels are nominally 3¢ base from dock for all orders.

**Plates.**—Some of the Plate mills are running short of orders, and are displaying some anxiety for business. We quote for round lots: Common or Tank, 2.10¢ @ 2.20¢; Refined, 2.15¢ @ 2.25¢; Shell, 2.4¢ @ 2.5¢; Flange, 3.4¢ @ 3.5¢; Extra Flange, 4¢ @ 4.1¢. For small lots of Steel Plates the quotations are as follows: Tank, 2.70¢ @ 2.75¢; Ship, 3¢; Shell, 3.1¢; Flange, 3.1¢, and Fire-Box, 4¢ @ 4.1¢, on dock.

**Merchant Steel.**—We quote nominally for the range from ordinary to good grades as follows: American Tool Steels, 7.5¢ @ 9¢; Tool Steel of special grades and finer qualities, 12¢ @ 20¢; English Tool, 13¢ @ 15¢; common grades, 7¢ @ 9¢; Crucible Machinery, 4.5¢ @ 6¢; Round and Flat Spring, 2.3¢ @ 2.5¢; Round-Edge Tire, 2.3¢ @ 2.5¢; Square-Edge Tire, 2.60¢ @ 2.7¢; Toe Calk, 2.6¢; Sleigh Shoe, 2.5¢ @ 2.6¢; Open-Hearth Machinery, 2.4¢ @ 2.6¢; and Bessemer Machinery, 2.15¢ @ 2.25¢, with freight allowance.

**Wire Rods.**—We continue to quote nominally, on a light business, \$38 @ \$39 for Ordinary Steel Wire Rods.

**Steel Rails.**—We hear of a sale to an Eastern road at \$34 of about 3000 tons, light section, to Florida, and of about 3000 tons of English Rails to the Michigan Central. We quote \$34 @ \$35, according to size of order, time of delivery, &c.

**Old Rails.**—No business whatever is reported either in Foreign Rails, which have declined to 53¢, c.i.f., or in American Old Rails. There are negotiations pending, however. A lot of 500 tons of Foreign Double Heads, at Baltimore, has gone into store, having been offered in vain at \$20. We quote this market \$18.50 @ \$19, and note that some in the trade report a hardening tendency.

**Scrap.**—The feeling is slightly better, after forced sales of lots held by weak parties. We quote \$18.25 @ \$18.50 from yard.

**Rail Fastenings.**—We quote nominally 2.40¢, delivered, for Spikes, and 1.80¢ @ 2¢ for Angle Fish Bars.

## Philadelphia.

Office of The Iron Age, 220 South Fourth St., PHILADELPHIA, July 6, 1886.

Business has been virtually suspended since date of our last report, so that there is nothing to be said as regards actual transactions. The outlook is considered to be somewhat promising, as there are a great many inquiries, some of which will doubtless result in business at an early date. The position is very sensitive, nevertheless, and every one appears to be watching sharply for

what turn things will take. There is quite a possibility of a sharp upward turn in prices, but it requires a start, and how that will come or whether it will come at all remains to be seen. The indications are not all favorable, and the course of the market will depend a good deal upon the character of the developments within the next 30 days. Reports of the grain crops are not by any means promising, and there is still considerable uneasiness among labor, and until the position is more fully understood a degree of hesitancy is not to be wondered at.

**Pig Iron.**—There is very little demand at present, but of good brands there is no surplus worth mentioning. Low grades are still plenty, however, and the market has an irregular appearance, owing to the anxiety to secure offers. Consumption is likely to be very light during the next two or three weeks, so that early improvement in the demand can hardly be expected. Prices about as follows: No. 1 Foundry, tidewater delivery, \$18.25 @ \$19 for standard, and \$19.50 @ \$20 for choice. Southern No. 1, ex-ship, \$17 @ \$18.50, according to brand. Gray Forge at tide, \$16 @ \$16.50 for standard Pennsylvania and Virginia Irons, and \$17.75 @ \$18 for choice brands. Southern, ex-ship, \$15 @ \$15.50, according to brand. No. 2 Foundry is dull and in large supply at \$17 @ \$17.50 at tide.

**Foreign Iron.**—There is nothing doing in Bessemer, and prices are nominal at \$19 @ \$19.50, c.i.f., according to brand. Spiegel Eisen is about \$21 for 10 @ 12¢, with \$25 asked for 20¢.

**Blooms.**—Steel Blooms are active within the range of our quotations, say: Slabs for Nail Plate, \$29 @ \$30 at tide for Foreign and \$30 at mill for Domestic, and from that to \$35 for higher qualities; special grades for Boiler Plates and other uses requiring high tensile strength, \$34 @ \$36. Other Blooms as follows: Charcoal, \$52 @ \$54; Run-out Anthracite, \$43 @ \$44; Scrap Blooms, \$33 @ \$34, and Ore Blooms, \$34 @ \$35.

**Muck Bars.**—Holders are firm at \$28 @ \$28.50 at mill, with a fair amount of business doing.

**Manufactured Iron.**—The mills in this vicinity closed on Wednesday last, and, it is said, will not start up again for some time to come. The men insist on a new schedule, which the employers just as firmly refuse, so that there is no alternative but a lock-out. There is certainly nothing in the position to warrant an increase in cost of production, so that from present appearances the strike will be a long one. There has been a good deal of inquiry for Finished Iron within the past couple of weeks, and it looks as though the mills might be kept busily employed, although at low prices. The tendency is to stiffen up a little, however, and, if the strike continues any length of time, slightly higher prices are not improbable. To-day's quotations are 1.8¢ @ 1.85¢ for Best Refined Bars, 1.7¢ @ 1.75¢ for Medium, 2¢ @ 2.1¢ for Plates and Angles, and 3¢ for Beams and Channels.

**Steel Rails.**—There is no change to report in this department; there is plenty of demand at steady prices, say \$34.50 @ \$35, at mill; perhaps \$34 for large lots, winter delivery. There are a good many inquiries on the market—some for deliveries a year ahead—the mills being almost filled up for the next four months.

**Old Rails.**—There is more inquiry, but sellers are so anxious for business that prices have not improved. There are free sellers at \$19.50, afloat for Philadelphia, but bids of \$19 are not easily obtained, except for small lots. A sale of 500 tons Bull Heads was made at \$19.50, afloat, and a choice lot of T's in the interior at \$21.50. Lots in store held at \$21 @ \$21.50.

**Scrap Iron.**—The market is firm, and holders ask outside figures, as follows: No. 1 Wrought Scrap, \$18.50 @ \$20; No. 2 do., \$13 @ \$14; Turnings, \$14 @ \$14.50; Old Car Wheels, \$15 @ \$16; Old Steel Rails, \$18.50 @ \$20; Fish Plates, \$23 @ \$24—sales 150 tons at \$23.25; Cast Scrap, \$14 @ \$15; do. Turnings, \$10 @ \$10.50.

**Nails.**—The market is very quiet, but prices are firmly maintained at \$2.10 @ \$2.15 from store.

## Pittsburgh.

Office of The Iron Age, 77 Fourth Avenue, PITTSBURGH, PA., July 6, 1886.

While there has been no perceptible improvement in general business the past week, a more hopeful feeling is being developed, and this has a good deal to do with bringing about an improvement. The outlook for a good fall trade is generally considered encouraging, and there is no good reason at present why these expectations should not be realized. The reports from the West and South are generally favorable. Mr. R. J. Anderson, the Steel manufacturer, is just back from a Western trip, and he reports that there has been a decided change for the better westward within the past few weeks. In the winter wheat growing States of Ohio, Indiana, Kentucky and Southern Illinois the wheat harvesting is almost finished. Mr. Anderson reports that it was commenced several weeks sooner this year than usual, so that farmers will have more time between harvesting and seeding to give to making improvements. Our manufacturers, in view of the favorable reports in regard to the crops, and the fact that the labor troubles are much less frequent, are in a more hopeful spirit, looking for a good fall trade, and as stocks both in

the hands of jobbers and consumers are light, it is probable that orders for nearly all kinds of manufactured goods will begin to come forward earlier than usual. The river Coal operators are in good condition for the summer, having got out about all the Coal they had loaded on the last two freshets, and nearly all the fleet of towboats succeeded in getting back with their tows of empty Coal craft.

**Ores.**—As nearly all the furnaces hereabouts are in blast, the consumption of Ore is large and likely to continue so during the remainder of the year. The project of building a railroad to connect Pittsburgh with the Ore fields of Eastern Virginia has again been revived, and sooner or later it will no doubt be accomplished. It is said that it will only require 150 miles of road to be built, and the scheme is most important to the Iron trade of Pittsburgh.

**Pig Iron.**—There has been no important change in the situation during the past week; trade continues very slow, but it is confidently expected that there will be an improved demand before the close of the month. The indications are favorable for an improved Finished trade, and this is all that is required to bring about an increased demand for the raw article. Stocks in hands of consumers generally are very much reduced, as they make it a point to close the month of June with just as little as possible, in order to take stock. Prices remain unchanged, as compared with those of a week ago, but have declined fully 50¢ per ton within a month or six weeks. We report former quotations:

No. 1 Neutral Mill	16.00 @ 16.35, 4 "
No. 2 Neutral Mill	15.50 @ 15.75, 4 "
All-Ors Mill	17.00 @ 17.25, 4 "
White and Mottled	18.00 @ 18.50, 4 "
No. 1 Foundry	18.00 @ 18.50, 4 "
No. 2 Foundry	17.00 @ 17.50, 4 "
Old Ore Foundry	18.50 @ 19.00, 4 "
Foundry Charcoal	20.00 @ 20.50, 4 "
Cold Blast Charcoal	24.00 @ 27.00, 4 "
Bessemer Iron	18.50 @ 19.00, 4 "

There have been sales of Bessemer Iron reported for some days; it is weak and has been offered in large blocks as low as \$17.75, cash. Considerable effort has been made here of late to push Southern Iron in this market, but not with much success. It is said that the "trial lots" of this Southern Iron have not proved very satisfactory, as it has been found to be too much inclined to be cold-short.

**Muck Bar.**—There have been no sales reported, in the absence of which we repeat former quotations, \$27 @ \$27.50, cash, as to delivery, quality, &c.

**Manufactured Iron.**—The mills have all had a very fair trade of late, which for a time was stimulated by the possibility of a strike, and the outlook at present is favorable for a good fall trade. Some of the mills are now stopped for stock-taking and repairs, but it is expected that they will all be running within a few weeks. Prices are still quoted on a basis of 1.65¢ @ 1.70¢ for Bars for first-quality Iron, and 1¢ @ 1¢ less for Old-Rail Iron. A number of mills are working almost exclusively on Skelp Iron, for which the demand is likely to keep up until the close of the year.

**Nails.**—There is not much inquiry at present, but it is expected that there will be within a few weeks, and some of our manufacturers are anxious to get started up as soon as possible, in order to work an assorted stock, so that they will be prepared for business as soon as it opens up. Jones & Laughlins have already started up, and Zug & Co., Chess, Cook & Co. and Moorhead & Co. will do likewise as soon as their factories have been placed in condition. Our Pittsburgh manufacturers have no non-union nailers, so that there will be no trouble on that score. Prices may be quoted in carlots at \$1.90 for Iron and \$2 for Steel Nails, 60 days, 2¢ off for cash. The regular meeting of the Western Nail Association takes place in this city on Wednesday of next week.

**Wrought-Iron Pipe.**—The Pipe mills are all busy, and are likely to be so until the advent of cold weather, possibly the close of the year. Prices remain unchanged. Discount on Black Butt-Welded Pipe, in carlots, 45¢; Butt-Welded Galvanized, 35¢; Black Lap-Welded 60¢; Galvanized, 42½¢. For less than a carload, discount, 2¢ less than rates above quoted. Boiler Tubes, 52½¢ discount; Oil Well Casing, 54-inch, 45¢ per foot, net; 2-inch Oil Well Tubing, 14¢; 8-inch Drive-Pipe, \$1.30.

**Steel.**—There is a lull in the Merchant Steel trade, but an improved demand is looked for within a few weeks; manufacturers generally expect a good fall trade. Best brands Refined Cast Tool Steel, 8¢ @ 9¢; Crucible Machinery, 3¼¢ @ 4¢; Open-Hearth do., 2¼¢ @ 2½¢; Steel Boiler Plate, 4¢ @ 4½¢; no recent sales of Bessemer Blooms or Billets or Rail or Bloom Ends reported, in the absence of which it is difficult to give reliable quotations.

**Steel Rails.**—Heavy sections are still quoted at \$36, cash, at mill for fall delivery; Mills here are not in condition to take any new business for delivery this side of October or November.

**Old Rails.**—The demand here continues light, as the large consumers are pretty well stocked and are refusing to make additional purchases unless they can do so at a bargain. We hear of some small sales of Old Iron Rails at \$21 here, and \$21.25 at Youngstown. Old Steel Rails are quoted, in the absence of sales, at \$20 @ \$20.50 for short and \$22 @ \$22.50 for short lengths.

**Railway Track Supplies.**—Prices remain unchanged at 2.40¢, 30 days, for Spikes, delivered; 1.65¢ @ 1.75¢ for Splice Bars, and 2.75¢ for Track Bolts with Square and 2.85¢ @ 3¢ with Hexagon Nuts.

**Old Material.**—There has been an improved business of late, and it is expected that all kinds of Old Material, Old Rails in particular, will rule much higher before the close of the present year. No. 1 Wrought Scrap, \$18 per net ton; Axle Turnings, \$14 @ \$15; Old Axles, \$23 @ \$24; Cast Borings, \$11 @ \$12, gross ton; Old Wheels, \$16; Cast Scrap, \$14 @ \$15, gross.

## Chicago.

Office of The Iron Age, 36 and 38 Clark St., Cor. Lake St., CHICAGO, July 5, 1886.

The existing strike of the Lake Shore switchmen caused more or less uneasiness among business men during the week. The fear of its extending to other lines was greatly allayed by the refusal of the switchmen's union to involve other roads in the fracas. The company have been successful in moving freight guarded by armed forces, though business men have avoided shipping goods by that line as much as possible. At the Calumet Mill, in Cummings, Ill., matters at last have been settled and their entire works are about being placed in operation. In the Nail department they are running 80 machines non-union, and the Bar mill started up on the 29th ult., but was stopped two days later on account of necessary repairs to one of the furnaces. The Bar mill, guide mill and Steel department will be again put into operation during this week, with every prospect of permanent employment. The fruitless results to strikers in the West has made it a discouraging and odious undertaking. The public have been so surfeited with the riotous conduct and detrimental effects of strikes on business that the laboring men who undertake to force their claims upon employers through this medium no longer enlist the sympathy of even those who feel that their grievances are just. In this city and in the West popular opinion says that the day of successful strikes is past, and the boycott has lost its terror in every branch of business.

**Hardware.**—The closing days of June and the opening ones of this month witnessed a still further decline in the demand for Hardware. The majority of the houses close at 1 o'clock on Saturday, and this week will not open until Tuesday morning, which lessens the business days of both weeks, and possibly destroys the ambition of buyers for several days to come. The jobber is now turning his attention more toward the purchase of fall goods. Jobbers claim that an average advance of 10% has been made on the whole line of Shelf Hardware. Changes have been made on Carriage Bolts which advance prices from 5 to 15%, making 80% discount a close price to the trade. Wood Stocks for Wagons, Carriages and Implements are said to be scarce and the mills full of work. The outlook for fall trade is very satisfactory, with the possibility of prices on the entire line ruling a trifle higher.

**Barb Wire.**—The market is in a pathetic state, and consumers, jobbers and makers have transferred their attention to preparing for the future rather than immediate business. Sales consist of only small, trifling lots which are hardly sufficient to substantiate a quotation. Jobbers make 3½¢ for Painted and 4¼¢ for Galvanized Wire a selling price for existing trade. Manufacturers in an indifferent way are still busying themselves on the pool project, with no noted steps toward completion.

**Nails.**—The conditions of the market have been of a most satisfactory character, with strong indications that present prices are pretty well sustained. Just upon what grounds makers and jobbers predict higher prices is difficult to determine, but it is nevertheless true that the feeling prevails that Nails will and must advance in price. Stocks are undoubtedly light, and, notwithstanding the fact that a number of idle mills will shortly go into operation, Nails are held more firm than a week ago. Jobbers continue to quote small lots of Iron Nails from store at \$2.10 rates, and have advanced Steel Nails in same quantities to \$2.25 rates, shading this price 5¢ per keg in carload lots. Jones & Laughlins have announced their price on Iron Nails as \$2.10, Chicago, in carload lots, but will not be able to deliver in any quantity for the next 30 days. The demand for the season is reported very good. Considerable trouble is experienced in obtaining full stocks of Steel Nails. The supply of Iron Nails is sufficient to meet requirements.

**American Pig Iron.**—Inquiries have been numerous during the past week. Every probable buyer has been testing the market, and the unanimity in quotations has been a surprise in many cases. On Lake Superior Charcoal Irons \$20 @ \$20.50, according to brand is the ruling carload price, though in lots of larger quantity and extended delivery these figures might be shaded 25¢ per ton. Furnacemen and sellers continue to enlarge upon the possible consumption of Charcoal Irons during the next six months, and the same is noted regarding some grades of Coke Irons, which are quoted at \$19 @ \$19.50 in carload lots. Ohio Standard Blackbands are held very steadily at \$20 @ \$20.50 for the three leading brands, with some

shading on other grades. The position of furnacemen and sellers is not unreasonable in the light of the inquiries that they have received and the work that is in prospect. Car building and railroad improvement is looked upon as the leading line of consumption, but there are many other minor lines of manufacture in which important improvements are noted. In view of this the above lines of Iron are held firm and form a large portion of the necessary crude material. On Cinder Mixed Irons there is no change, prices being regulated according to quality at about \$18 in carload lots as an average price. A sale of from 2000 to 3000 tons of Southern Iron is reported, which has aroused sellers of Southern Irons, and in a measure substantiates the following quotations of \$17.50 @ \$18 for No. 1, \$17 for No. 2, \$16 @ \$16.50 for No. 2½ and \$15.50 for No. 3. It is claimed by Southern furnacemen that these figures are not satisfactory, and we frequently hear it said that they have no Iron to sell at such prices. There is, however, a feature that cannot be lost track of. These Irons are abundant and constantly seeking consumers at the present rate of production. In addition thereto it is announced that several new stacks will shortly be blown in and one or two new plants put into operation. With that increased supply in the market there is certainly very little prospect of higher prices on this grade of Iron, which will have considerable influence through competition in retarding an advance in price on other grades. While there is considerable increase looked for in consumption, no one is enthusiastic over obtaining higher figures. It is believed that makers will be well satisfied if they can sustain present prices for the balance of the year, for which they have a favorable prospect at present.

**Merchant Steel.**—There is no improvement to note in the market. The tonnage for the month of June was very light, and the opening days of the present month bring no encouragement. Reports on prices of some of the most prominent brands show increased weakness and great anxiety on the part of manufacturers to make sales. On Tool Steels figures that were equally as low as any made last summer are circulated among sellers and buyers, and with the demand from agricultural men it is believed that still lower prices will be experienced. On the best grades of Tool Steels a slight improvement in demand has occurred, as sellers have refused to meet manufacturers of other grades. The market remains nominally at former quotations.

**Steel Rails.**—Makers here renew the quotation of \$38 for first-quality Steel Rails and \$34.50 for seconds. Mills are reported to be full of work, with some additional demand for late fall delivery.

**Bar Iron.**—A strong effort is being made on the part of some manufacturers to obtain better prices on Merchant Bars. Jones & Laughlins have advanced their price to 1.80¢ from mill in carload lots, and 1.85¢ @ 1.90¢ from store, according to quantity of extras, making their rates about \$1 per ton higher than 10 days ago. It is said that for this class of Iron the demand is considerably better, with fair prospects of a greatly increased fall business. On Common Bars, Old Rail stock, the market shows no improvement either in demand or price. There are sellers who are asking higher figures, but have not strength enough to support their views when it comes to making sales. We hear of one merchant lot sold at figures which discount all previous prices named this year. From store quotations on small lots are made at 1.75¢ rates, and from mill range from 1.55¢ to 1.65¢ rates. In view of the situation between manufacturers and their workmen it is not thought that higher prices will prevail except it be brought about through a determined effort on the part of manufacturers to obtain a certain figure or not sell.

**Structural Iron.**—Very little new business is being done. Orders for small lots of Beams are coming in, and specifications for bridge work have been placed for estimates during the week on work that has been previously let. Builders are considerably exercised over their inability to obtain material as rapidly as they desire.

**Old Rails.**—There has been a slightly increased demand during the week, and \$19.50, Chicago, is quoted by the N. C. R. M. Co. A few sales are made at these figures, but holders are asking higher prices.

**Galvanized Iron.**—Jobbers report some improvement in the demand from country sections, while sales agents complain that the demand from the cornice trade was less than a week ago. We renew jobbers' quotations from store: Juniata, 60 and 10¢ off, and Charcoal, 60, 10 and 5¢ off. A renewed rivalry between some of the makers for orders on certain qualities of Sheets is noted, with slight concessions announced on makers' prices.

**Scrap Iron.**—Dealers made reasonable effort during the week to dispose of some of their stock, but prices bid do not meet the views of the sellers. On No. 1 Wrought sellers are quoting \$17.50; No. 1 Mill, \$14, and No. 2, \$9. Sales of the first grade could be made at about \$1 per ton less. Other grades of Scrap remain in about the same condition as last reported.

Messrs. Mack & Durkee have been appointed general Western agents for the sale of the Girard Pig Iron, made at Girard, Ohio. This furnace has been running on Mill Iron for some time past, but have now turned their attention to manufacturing exclusively Lake Superior Coke Irons.



## Birmingham.

BIRMINGHAM, ALA., July 5, 1886.

In the agricultural portions of this State the tendency of business is still downward. Rain continues to fall about every other day. In the greater part of the cotton belt the staple has certainly been damaged beyond the possibility of entire recovery, and the outlook is that the crop will be one of the poorest that has been gathered since the war. Corn suffers severely, too. In some sections, according to the newspaper accounts, the farmers are almost forced to a choice between the two crops, one being as much as they can get out of the grass to an extent that will pay for the necessary work. As farmers' lamentations have traditionally been taken *cum grano*, however, it is not unreasonable to hope that things are not so bad as they seem. Matters are not so blue in the mining and manufacturing district, though there's nothing conspicuously rose-colored in the little news of the last week. Active railroad building continues to make business good in heavy goods, some of the largest contractors on the Kansas City Railroad (as the Birmingham and Memphis is popularly called) having broken ground in the last few days. The Sloss Furnace Co., too, have commenced grading for several miles of track, to connect an iron-ore property with the Alabama Great Southern road, near Irondale, 5 miles out of the city. Labor is in demand at \$1.25 per day, the Kansas City men having raised the price 25¢. Ore lands are eagerly sought after. The trade spoken of in this correspondence last week, by which a New York syndicate was to get 800 acres of Red Mountain lands, has been consummated. Preparations continue for increased operations among the Ore contractors already in business.

**Pig Iron.**—Is feeling to a slight degree the effect of the labor troubles in the East, which naturally blunt the edge of competition for Western trade. Some cessation of cutting among Southern producers is to be noted, and an advance of some 25¢ over the prices of a week ago, which, however, just about offsets the effects of the depressing agencies that have been at work for the last month or so. Shipment is notably easier, except eastward, cars being still scarce on the lines running that way.

**Finished Iron.**—In this line the most troublesome cuts seem now to come from Southern manufacturers. But for these it seems prices would probably be just about what they were all spring. The demand is not quite what it has been, though.

**Nails.**—Are a little weak, with the nominal rate at Brierfield and Helena still \$2.25. There is a distinct downward tendency.

**Miscellaneous.**—Outside of orders for portions of railroad contractors' outfits nothing worthy of note has been taken in by the shops this week. All are busy enough on business of creditable character. A flouring mill just starting is using a 125-horse-power Corliss engine made by the Birmingham Iron Works, and the first of the kind ever made in the South, it is said.

## Chattanooga.

Office of The Iron Age, Carter and Ninth Sts., CHATTANOOGA, July 5, 1886.

There have been no changes of importance in general business since our last report. Towns located in the vicinity of the manufacturing districts are having a good run of business in all lines, while those so located as to be dependent upon the farming districts are complaining very much of dull trade and collections hard to make. Rains have not been so prevalent for the past week, enabling the farmer to pay more attention to his crops, which had begun to look almost past redemption.

**Pig Iron.**—Sales of Pig Iron appear to be made about as fast as the furnaces are able to turn it out. While many sales are being made on private terms, yet, so far as we know, the price appears to keep up remarkably well. Interior parts in Pennsylvania are lately taking iron in considerable quantities, and from the many inquiries that are being received from that section it would appear that consumers there are looking in this direction for their supplies. Eastern points are not behind in the demand for Southern Pig; within the last two weeks about 33,000 tons have been contracted for for these markets to go forward during the balance of the year. The demand from Southern foundries has fallen off to some extent, their business at this season being usually dull, but contracts are being freely made by them for fall delivery.

**Lumber.**—Business in this line has kept up remarkably well. The heavy rains have had a tendency to keep up the streams, and the millmen have taken advantage of it to keep their mills well supplied with logs. The consequence is that shipments have been as heavy as at any time during the spring.

**Miscellaneous.**—The prospect of the construction of a Pipe mill at this place is now reduced to a positive certainty. Most of the machinery is contracted for and will be on the ground as soon as completed. They will run in connection with the Lookout Iron Co., who will make the Skelp Iron for them. At present it is their intention to make only Butt-Welded Pipe. The mill is expected to be in operation about the first of the coming year.

## Cincinnati.

JULY 5, 1886.

**Pig Iron.**—Dealers report that, while inquiries from consumers are abundant, but few orders have been placed, and most for present use, and at prices not fully sustaining former quotations. A sale to one of the rolling mills here of 3000 tons Southern Forge is reported for delivery through the year; prices not stated. It is the policy of producers to sell their product as fast as made, or to sell anticipating their makes. Consumers who know of their future wants are fully aware of the situation, and are dictating as to prices and times of delivery. Dealers here who are the agents of the large producers in the South, appreciating the situation, have already made prices to the largest consumers in the West and Northwest to secure the orders. An increased amount of trade throughout the West is expected, but it is thought that the trade must wait for more substantial development.

Quotations for the past week:  
**Charcoal Foundry.**  
 Hanging Rock, Best, No. 1, 4 mos. \$31.00 @  
 Hanging Rock, Good, No. 1, 4 mos. 30.00 @  
 Hanging Rock, Good, No. 2, 4 mos. 18.50 @  
 Southern No. 1, 4 mos. 18.00 @  
 Southern No. 2, 4 mos. 17.00 @

**Coke Foundry.**  
 Ohio and West Pennsylvania, No. 1, 4 mos. 18.00 @  
 Ohio and West Pennsylvania, No. 2, 4 mos. 17.00 @  
 Southern-Virginia, Tennessee, Alabama and Georgia, No. 1, 4 mos. 16.50 @  
 Southern-Virginia, Tennessee, Alabama and Georgia, No. 2, 4 mos. 16.00 @  
 Close Foundry and Mill grades. 14.50 @ 15.50

**Silver-Gray Softeners.**  
 Ohio Stonecoal, No. 1, 4 mos. 17.50 @  
 Ohio Stonecoal, No. 2, 4 mos. 16.50 @  
 Ohio Stonecoal, No. 3, 4 mos. 15.00 @ 17.00

**Car-Wheel.**  
 Southern Warm-Blast Char'l, cash 17.00 @ 18.00  
 Southern Standard Warm-Blast Charcoal, 4 mos. 25.00 @ 26.00  
 Hanging Rock, Warm-Blast Charcoal, 4 mos. 19.00 @ 20.00  
 Hanging Rock, Cold-Blast Charcoal, 4 mos. 23.00 @ 25.00  
 Southern Cold-Blast Charcoal, 4 mos. 24.50 @  
 Maryland and Virginia. 27.00 @ 29.00

**Forge.**  
 Southern Coke, Neutral, 4 mos. 14.50 @ 15.00  
 Southern Coke, Cold-Short, 4 mos. 13.50 @ 15.00  
 Southern Coke, low grades. 13.00 @ 14.00  
 Other makes, various grades. 15.00 @ 17.00

**Scrap.**  
 Rails. 20.00 @ 20.50  
 Wheels. 16.50 @ 17.00  
 Wrought, for range of grades. 100 lb. 30 @ 35  
 Cast, for range of grades. 100 lb. 30 @ 35  
 Customary discount, 40¢ @ 50¢ per ton for cash from time prices.

## Louisville.

**GEORGE H. HULL & Co.,** of Louisville, report to us as follows, under date of July 6: There is a much better inquiry for Pig Iron and more sales have been made, but there is no improvement in price, and on inferior Irons slightly declining. The favorite brands as a general thing are held firmly, and when sales are made are usually sold at sellers' figures. On other brands sellers are making concessions to meet these views. A large difference is the consequence on sales booked between the different brands ordered—in some cases as much as \$2, but usually not more than \$1 @ \$1.50. We quote for cash as below:

**Pig Iron.**  
 Southern Coke, No. 1 Foundry. \$16.00 @ \$17.00  
 " " No. 2 " 15.00 @ 16.00  
 " " No. 3 " 14.50 @ 15.50  
 Hanging Rock Coke, No. 1 Foundry. 16.00 @ 16.50  
 Hanging Rock Charcoal, No. 1 Foundry. 18.00 @ 19.00  
 Southern Charcoal, No. 1 Foundry. 17.00 @ 18.00  
 Silver Gray, different grades. 14.00 @ 15.00  
 Southern Coke, No. 1 Mill, Neutral. 14.50 @ 15.00  
 " " No. 2 " 13.50 @ 14.00  
 " " No. 1 " Cold-Short. 13.50 @ 14.00  
 " " Charcoal, No. 1. 17.00 @ 17.50  
 White and Mottled, different grades. 12.00 @ 13.00  
 Southern Car-Wheel, standard. 25.50 @ 26.50  
 Southern Car-Wheel, other brands. 19.50 @ 20.50  
 Hanging Rock, Cold-Blast. 23.50 @ 24.50  
 " " Warm-Blast. 19.50 @ 20.50

**Old Material.**—The market for Old Material is quite, and on the whole dull. There has been some demand for Old Rails and Wheels. Old wheels are offered at \$15, and \$14.50 is bid for them; there have been some sales made at inside quotations. Small sales of other descriptions of Scrap have been made, which, according to the quality of the lots, will bring from inside to outside quotations.

**Rails.** \$100.00 @ \$100.50  
 Wheels, \$100.00 @ \$100.50  
 No. 1 Wrought, \$100.00 @ \$100.50  
 No. 1 Country Wrought, \$100.00 @ \$100.50  
 No. 1 Cast, \$100.00 @ \$100.50  
 Bolters, cut, \$100.00 @ \$100.50  
 Bolters, uncut, \$100.00 @ \$100.50  
 Axes, Tanks and Sheets, \$100.00 @ \$100.50  
 Axes, \$100.00 @ \$100.50

## St. Louis.

**ROGERS, BROWN & Co.,** St. Louis, W. H. SHIELDS, manager, report, under date of July 5: There is considerably more inquiry, and buyers seem inclined to contract at present prices for their future wants, having evidently made up their minds that prices have at last touched bottom. We quote for cash, f.o.b. cars St. Louis:

**Charcoal Foundry.**  
 Missouri. \$17.00 @ \$18.00  
 Southern. 17.00 @ 18.00

**Coal and Coke Foundry.**  
 Southern, No. 1. 17.00 @ 18.00  
 Southern, No. 2. 16.00 @ 17.00  
 Ohio Softeners. 17.00 @ 20.00

**Mill Iron.**  
 Missouri. 16.00 @ 16.50  
 Southern. 15.00 @ 15.50

**Car-Wheel and Malleable Irons.**  
 Southern. 20.00 @ 21.00  
 Lake Superior. 21.00 @ 22.00

**Scrap, etc.**  
 Old Wheels. 18.75 @ 19.25  
 Connorsville Coke (Pick's). 18.00 @ 18.50

## Coal Market.

So far from being advanced July 1, the prices of Anthracite are more affected by weakness than at the time of our last report—not to say that they are perceptibly lower, for if there is any reduction the commission man has the benefit of it rather than the consumer. As the story goes, a cut was initiated by the Delaware and Hudson Canal Co. on the representation by customers that other parties were underselling, whereupon the Delaware and Lackawanna determined to meet any cut which rivals might make. Including an allowance in the shape of commissions it is said that Broken and Egg were offered 50¢ off from the circular. Quotations therefore run about as follows: Broken and Egg, \$2.90; Stove, \$3.25; Nut, \$3, f.o.b. At some of the large Coal agencies in this city no special activity is looked for much before September. The *Pottsville Miners' Journal* of July 3 says: "There is little prospect of improvement for the month at least, as transactions are limited to actual needs, owing to the prevalent belief in a continued unsettled market. Stocks are again beginning to accumulate at tidewater points, and production is going on without much regard to the quota assigned." In some quarters the alleged failure of several companies in the so-called combination to restrict production to the prescribed limits constitutes a serious grievance, suggesting retaliatory "cuts." The total production for the first half of this year is about 2,000,000 tons in excess of the output for the corresponding period of 1885. On May 31 the stock of Coal on hand at tidewater shipping points was 614,451 tons, compared with 525,641 tons at the corresponding date last year. In the fall an increased production will be natural as a result of an extension of the Pennsylvania Railroad into the Schuylkill region, where, it is said, they are making overtures for new business. Bituminous Coal is very quiet, and can be bought at \$3.15, f.o.b. in New York, or even lower.

Vessels are plentiful, but the National Association claim that the minimum rates are fully maintained, despite the scarcity of freights. There are now over 1000 vessels in the association.

## Imports.

The following were the Imports of Hardware, Iron, Steel and Metals into the Port of New York for the week ending July 7, 1886:

Hardware.	Wire rods, coils, 4250 Rollers, cs., 27
Roker Hermann & Co. Cutlery, cs., 8	<b>Steel.</b> Cooper, Hewitt & Co. Coiled wire rods, bolls, 100
Brown Bros. & Co. Cases, 4	Maylor & Co. Sheets, box, 1
Dierkerhoff, Rafflower & Co., Cases, 2	Newton & Shipman, Cases, 3
Field Alfred & Co. Cases, 2	Bundles, 44
Guns, cs., 2	Bars, 15
Folsom H. & D. Guns, cs., 11	Filditch F. S. Pkgs., 125
Gone Bros. & Dryckman, Cases, 8	Flock & Co. W. Rods, bolls, 842
Hammill & Booth, Mach'y, cs., 2	Sheldon Geo. W. & Co. Bundles, 70
Hartley & Graham, Arms, cs., 52	Bars, 11
Keidel Moritz, Arms, cs., 27	Plates, 22
Knobel H. & Co. Cases, 2	Order. Rods, bolls, 7348
Knauth, Nachod & Co. Ironware, cs., 2	Bars, pkgs., 2150
Lau J. H. & Co., Cutlery, cs., 4	Billees, 93
Lazarus A. S., Mach'y, box, 1	Old leaf spring, tons, 101
McKibbin G. S., Mach'y, cks., 2	Flange rails, 1165
Merch. Disp. Co. Arms, cs., 23	Tubes, 220
Neider C. W., Locks, box, 1	Tubes, cs., 8
Newton & Shipman, Files, cks., 2	<b>Metal.</b> Bruce & Cook, Tin plates, bxs., 329
Neuss, Hesselein & Co., Cases, 2	Central Stamping Co. Tin plates, bxs., 3896
Schutte W. & Co. Cases, 8	Dickerson, Van Dusen & Co. Tin plates, bxs., 1135
Stoddard, Lovering & Co., Mach'y, cs., 40	Erie & Gt. W. Disp. Co. Tin plates, bxs., 194
Wielbusch & Hilger, Pkgs., 33	Hartley & Graham, Brass tubes, case, 1
Mdse., cs., 38	Hendrick Bros. Antimony, cks., 54
Williams & Rankine, Cases, 4	Lamarache's Son, H. Spelter ingots, 1244
Order. Mach'y, pkgs., 66	Mdse., cs., 10
<b>Iron.</b> Abbott Jere & Co. Bdls., 48	Merch. Disp. Co. Tin plates, bxs., 4
Baring Bros. & Co. Wire rods, coils, 1542	Phelps, Dodge & Co. Tin pl'tes, bxs., 14,459
Nail rods, bds., 2250	Reg. antimony, cks., 23
Ore, tons, 150	Shepherd Sidney & Co. Tin plates, bxs., 868
Roller wire, bds, 1824	Strauss A. D. & Co. No. 20 metal, bolls, 30
Bars, 2480	The Pratt Mfg. Co. Tin plates, bxs., 552
Crocker Bros. Pig, tons, 300	Warren, J. M. & Co. Tin plates, bxs., 517
Downing R. F. & Co. Girders, 157	Wielbusch & Hilger. Per. caps and rods, Cases, 7
Flock & Co. Bars, 122	Order. Tin ingots, 1461
Order. Bars, 267	Bismuth metal, cs., 8
Bars, 567	Tin slabs, 6096
Bars, plates, bds., 135	Antimony, cks., 50
Old rails, 620	Tin plates, bxs., 21,563
Spiegel, tons, 400	Nickel, cs., 5
	Lead, pkgs, 1500



# Trade Report.

## General Hardware.

The volume of business in June is generally referred to as fairly satisfactory, and probably aggregating in excess of last year's trade the same month. The present demand is not heavy, but a fair business is doing, and the market is characterized by a hopeful feeling that the trade of the season will be good. With the exception of a few leading lines which are weak and irregular, prices generally are firm, with perhaps a slight upward tendency. Rather more than the usual number of buyers are in the market at this time. The stock of goods in manufacturers' hands is not in most lines as large as usual at this season, and the trade throughout the country are generally regarded as having but limited stocks.

In regard to the report which was mentioned in our issue of the 17th ult. to the effect that the jobbing houses who recently met at Kansas City decided that Chicago jobbers should not sell Hardware west of the Mississippi River, we have received a communication from the secretary of the Mississippi and Missouri Valley Hardware Association, to whose meeting the report referred. After expressing the opinion that the only ground for such a statement was the fact that there was a meeting of Hardware jobbers in Kansas City, the secretary continues:

The annual meeting of the Mississippi and Missouri Valley Hardware Association was held at Kansas City June 1 and 2. The object of this association is to promote the interests of the trade, and by an exchange of ideas and opinions to cultivate a closer and more harmonious relationship among its members. It has not as yet undertaken the task of fencing in the territory west of the Mississippi River, and I am not aware that any of its members have even contemplated so stupendous an undertaking. While the statement of your correspondent "that we had decided that Chicago jobbers should not sell west of the Mississippi River" is almost too absurd to call for a reply, notwithstanding I deem it my duty as secretary of the association to free its members from the imputation that they would be so mean as to deprive their brother merchants of Chicago of the rights and privileges granted by the Constitution. The Hardware jobbers of the Mississippi and Missouri River valleys are pleased to meet their Chicago rivals on any field, and are capable of demonstrating to the merchants of the West and Northwest their ability to get their share of business. In justice to the members of our association, all of whom are your patrons, I trust you will give this communication publicity in your valuable paper. Yours respectfully,  
Geo. L. FARWELL, Secretary, &c.

### BARB WIRE.

The New York market has shown all the dullness due to a broken week in an off season, and has been maintained fairly steady. We quote for Four-Point Galvanized Barb Wire, in carload lots, 4 1/2 cents, delivered.

### NAIIS.

The New York Nail market remains in practically the same condition. It is pointed out by manufacturers that during the month of July the usual summer stoppages will be even more general and prolonged than in former years, on account of the low prices and the accumulation of stocks on the part of the stronger concerns who were adverse to marketing at the prices prevailing for some time. We quote nominally \$2 to \$2.05 for small lots of Iron Nails from store, with the usual concessions for carload lots.

### MISCELLANEOUS PRICES.

The recent entrance into the market of a number of new concerns making Wire Nails, together with the large capacity of the manufacturers already in the field, has had the effect of weakening somewhat the prices at which this line of goods are held. There is no change in open quotations, but concessions have been made to close buyers. Efforts are, however, being made to check this condition of things and to re-establish the market on these goods. With a view to accomplishing this a conference of manufacturers is to be held in this city, and the hope is expressed that the former prices will be again made firm.

There is some irregularity in the price of Rivets, and careful purchasers are often able to obtain the extra discount of 7 1/2 per cent. on small lots. Close buyers are in most cases able also to get material concessions on large lots.

The Screw market continues irregular, and the tendency is toward lower prices. Extras are given by the large and small companies with more freedom.

The Penn Hardware Co., Reading, Pa., advise us that they contemplate making changes in their prices to agree with the advanced quotations of the other manufacturers of Cast Iron Shelf Hardware, to which we referred in our last issue.

The following is the price list of the Manufacturers' Flexible Steel Scales manufactured by Coffin & Leighton, Syracuse, N. Y., the list being subject to a discount of 25 per cent:

Length, inch	2	3	4	6	9
Approx. width, inch	1 1/2	1 3/4	2	2 1/2	3
Thickness, inch	1 1/2	1 3/4	2	2 1/2	3
Price	\$0.30	\$0.40	\$0.50	\$0.75	\$1.12

Length, inch

A joint circular of the following manufacturers of Common Carriage Bolts has been issued, dated Cleveland, Ohio, June 30, announcing the withdrawal of all quotations on Common Carriage Bolts:

LAMSON & SESSIONS Co., Cleveland, Ohio.  
HOTCHKISS & UPSON Co., Cleveland, Ohio.  
CHAPIN BOLT AND NUT Co., Cleveland, Ohio.

LAKE ERIE IRON Co., Cleveland, Ohio.  
ARMS BELL Co., Youngstown, Ohio.  
PLUMB, BURDICK & BARNARD, Buffalo, N. Y.  
SYRACUSE BOLT CO., Syracuse, N. Y.  
C. B. HEAD, Pittsburgh, Pa.  
OLIVER BROS. & PHILLIPS, Pittsburgh, Pa.  
L. M. DAYTON, Cincinnati, Ohio.  
MICHIGAN BOLT AND NUT Co., Detroit, Mich.  
TOLEDO BOLT AND NUT Co., Toledo, Ohio.

It is also intimated that new quotations will be furnished on application, and it is understood that the new prices will be an advance of nearly 10 per cent. beyond the extreme prices lately prevailing.

It is expected that a meeting of the manufacturers of Coffee Mills will be held this week, when it is intimated as not unlikely that an advance in price will be determined upon.

The following are the prices of the Conical Bolster Spring, manufactured by W. F. Haggard, Lafayette, Ind., which are subject to a discount of 50 per cent.:

No. 1 per set of four	\$6.00
No. 2 per set of four	7.00
No. 3 per set of four	8.00

These Springs are alluded to as having an extensive sale in Southern California, and in the fruit-growing districts of Michigan, Ohio and New York, and as meeting the demand of the trade for something simple, cheap and durable in this line.

The following circular relating to Coes' Wrenches has been issued announcing the continuance of present prices:

NEW YORK, July 1, 1886.

We are instructed to confirm existing prices for Coes' Genuine Screw Wrenches of either make, including L. Coes & Co's Knife Handle, at 60 per cent. discount from list. "Mechanics" Wrenches, made by L. Coes & Co., and similar quality by A. G. Coes & Co., will continue to rate at 10 per cent. less than the "Genuine." A special discount of 10 per cent. will be allowed on specified orders for 50 dozen for immediate shipment. Terms, 90 days, or 3 per cent. discount for cash in 10 days. Parties having purchased the quantity will be entitled to the extra discount on subsequent orders during balance of season ending December 31, 1886. Above quantity must be taken from either one or the other manufacturer, and includes only the Coes Genuine Pattern or L. Coes & Co's Knife Handle, and not the Mechanics made by L. Coes & Co., or a similar quality made by A. G. Coes & Co., the price of either being 10 per cent. less than the "Genuine," and are subject to the same quantity schedule.

J. C. McCARTY & Co.,  
Agents for L. COES & CO.  
JOHN H. GRAHAM & Co.,  
Agents for A. G. COES & CO.

Manhattan Hardware Co., Reading, Pa., announce that they are intending to advance prices on goods made by them about 10 per cent. before long.

The New York Supply Co., 50 and 52 John street, New York, issue a price list of the American Steam Gauges, a full line of which they carry in stock. They also issue circulars giving the standard list of Galvanized Malleable Iron Fittings, and describing the North American Injector, of which a reduced price list is given.

The following revised price list of Cordage is issued July 6, and is subject to the usual discount to the trade of 1 cent per pound:

Manila Rope.	Cts. per lb.
1 1/4 inch cir. and upward	12 1/2
12 thread, or 5/16 inch diameter	13
6 and 9 thread, or 1/4 and 5/16 inch diameter	13 1/2
Hay Rope, 2, 3, 4 or 5 thread	12 1/2
Bolt and Point Rope	14
Tarred Rope and Lath Yarn	12

Shawl Rope.	Cts. per lb.
1 1/4 inch cir. and upward	9
12 thread, or 5/16 inch diameter	9 1/2
6 and 9 thread, or 1/4 and 5/16 inch diameter	10
Hay Rope, 2, 3, 4 or 5 thread	9
Tarred Rope	8 1/2
Lath Yarn	8

Russia Hemp.	Cts. per lb.
White Rope	17
Tarred Rope and Ratline	17 1/2
Spun Yarn	10 1/2
Bolt Rope	18
Marline, Houseline, Rounding and Hambro-line	15
Packing	16

American Hemp.	Cts. per lb.
White Rope	18
Tarred Rope and Ratline	18 1/2
Spun Yarn	12
Lath Yarn	12 1/2
Packing	17 1/2
Marline, Houseline, Rounding and Hambro-line	15
Sash and Bell Cord	25 to 35

Italian Hemp.	Cts. per lb.
Packing	14 to 20
Tarred Rope	16

Jute.	Cts. per lb.
Rope and Packing	6 1/2
Cords and Lines	7 1/2

Oakum.	Cts. per lb.
Best Oakum	7 1/2
U. S. Navy	6 1/2
Navy	6 1/4

On 100 bales and over.

The following are the prices announced by the Alford & Berke Co., 77 Chambers street, New York, on Goldman's Patent Atomizer and Sprinkler, a description of which is given among the Hardware Novelties on page 31:

In lots of less than six dozen, per doz.	\$2.50
Half gross lots, per gross	\$27.00
One gross lots, per gross	\$24.00

It is stated that with each quarter gross an iron rack to hold six Atomizers, with show card, is furnished. This article is intended to retail at 35 cents.

The Hunter Sifter Mfg. Co., Cincinnati, Ohio, and 35 Murray street, New York, issue an attractive pamphlet calling attention to their special machinery for bakers, millers, grocers, &c., in which the different machines they manufacture are illustrated and described. They also issue a special notice that, owing to the increase in the price of skilled labor and materials, and the large number of improvements recently made on their Machines, on September 1, 1886, and thereafter, the net prices of Lightning Sifters and Mixers will be advanced to prices given in their circular. They also sent out an attractive Mikado advertising card relating to the Hunter Sifter, furnishing with it an easel on which it may be placed.

### ITEMS.

W. S. Rathbone, the trade will learn with regret, has been compelled by ill-health to withdraw from the firm of Buhl, Sons & Co., Detroit, Mich., with whom he has been connected for the past 15 years. The appreciation in which he is held by his late associates is evidenced by the fact that he was presented on his retirement with a fine Colt's Hammerless Shotgun. It is expected that relaxation for a while from the pressure of close application to business will restore Mr. Rathbone to his accustomed health.

The Conroy Refrigerator Door Fastener, manufactured by P. J. Conroy, Philadelphia, has been on the market only a short time, but is referred to as appearing to meet the wants of the trade. The advantages claimed for it are that when opening the door the handle is lifted, which throws the door open, and in closing, by pushing the handle down, the door is closed exceptionally tight.

We are requested to announce that Pratt & Craig, of Des Moines, Iowa, have sold their entire stock of Hardware, &c., to Peavey Bros., Sioux City.

F. Roloson, Baltimore, Md., issues a new catalogue describing his improved Dry Air Refrigerators, and in connection therewith refers to some of the uses for which his varied line is especially adapted, and gives a large number of references.

Our readers will observe the advertisement on page 18, in which a line of Roller Skates is offered at special prices. The opportunity may be worthy the attention of the trade.

Kelly, Waus & Co. Chicago, have just completed their new catalogue of Heavy Hardware, Wagon and Carriage Irons, Wagon, Carriage and Implement Wood Stock, Handles, Vises and Blacksmiths' Tools, which will be distributed to the trade with goods ordered.

G. M. Brubaker & Polk, of Millersburg, Pa., manufacturers of "Common Sense" Screw Plate Machinist's Hand, Machine, Blacksmith's Taper, Gas and Steam Fitters' Taps, Machine Screw Taps and Screw Plates and Dies, Rivet Sets, Cast-Steel Cold Chisels, &c., have appointed James E. Halsey agent for the sale of their goods. Mr. Halsey is now located with Geo. B. Curtis at 96 Chambers street, New York City, agent for Beatty's Cleavers and Edge Tools, Chapin's Rules, "Custer" Scale Beams, Lamson & Sessions Co. Wrenches and Carriage Bolts, &c. Mr. Halsey would be pleased to see his many friends at his new location.

George H. Sargent, of Sargent & Co., sails on Saturday on the steamer Rhineland for Antwerp.

Announcement is made of the dissolution by mutual consent of the co-partnership heretofore existing between Joseph H. Jackson and Charles T. G. Chase, under the firm name of J. H. Jackson & Co., 206 and 208 Franklin street, New York. J. H. Jackson, who will sign in liquidation, will continue the Iron and Steel business at the same location.

In advance of the issue of the complete catalogue the George D. Winchell Mfg. Co. send us a list of their line of Coal Vases, Coal Hods, &c., to the completeness of which they allude, as well as to their production of goods of superior quality and finish and artistic decoration. The circular also illustrates their new Keystone Chamber Set, a recent addition to their line, to the elegance of which they call attention.

The Findlay Stave and Handle Co., Findlay, Ohio, issue circulars relating to their line of Bent Shovel, Spade, Scoop, Hay, Rake and other farming tool Handles, in which the extensive line of these goods is enumerated, with list prices.

With reference to the demand for Copper Rivets and Burrs in assorted half-pound boxes, which has been alluded to in these columns, Wallace & Sons, 89 Chambers street, announce Rivets, assorted lengths, 3/4 to 1 1/4 inch, with Burrs to match, in 1-pound or half-pound paper boxes, and in solid cases of 100 pounds. We are also informed that the Rome Iron Works, Rome, N. Y., are also putting them up in a similar manner.

### LOGAN & STROBRIDGE,

New Brighton, Pa., issue a new attractive and complete illustrated catalogue showing their line of Coffee Mills, Hand and Power, Corn, Rice and Spice Mills, Builders' Hardware and House Furnishing Goods and Specialties. On these lines list prices are given, with descriptions, and the following discount sheet is issued as applying to the catalogue. It will indicate in detail the

goods manufactured by this house and the prices at which they are quoted. It is subject to a discount of 2 per cent. for cash in 10 days:

	Dis.	per cent.
Coffee Mills	45	
Anchor Side Mills	40	
Steamboat Coffee Mills	45	
Brighton Spice Mills	45	
Cracker Mills	45	
Domestic Corn Mills	40	
Plantation Mill	30	
Anchor Corn Mill	40	
Monarch Corn Mill	40	
Monarch Pulley	25	
Farm Roller Mill	25	
Dog Powers	25	
Umbrella Stands	35	
Kitchen Saws	45	
Fire Iron Stands	45	
Fire Saws	40	
Fire Irons	60	
Fire Pokers	50	
Fire Shovels	50	
Coal Claws	50	
Gem Pans	60	
Star Gem Pans	60	
Vienna Roll Pans	60	
Lightning Miners	50	
Five Cent Oil Stove	50	
Lamp Bracket	50	
Clothes Line Reel	50	
Sad Iron Stands	50	
Milk Can Handles	50	
Stove Lid Lifters	50	
Toy Hatchet	50	
Tack Hammer	50	
Meat Cutters	40	
Car Openers	50	
Wax Cups	60	
Match Safes	60	
Broom Holders	50	
School House Hooks	40	
Cigar Holders	50	
Boot Jacks	50	
Towel Roller Ends	40	
Coffee Pot Stands	50	
Candle Sticks	50	
Trevoles	50	
Screw Drivers	40	
Nut Crackers	40	
Cherry Seeders	50	
Meat Saws	50	
Sausage Stuffers	40	
Gate Latches	50	
Gate Hinges	50	
Gate Latches and Hinges	40	
Foot Scrapers	50	
Barn Door Latches	50	
Bronze Thumb Latches	50	
Bronze Store Door Latches	40	
Thumb Latches	40	
Wardrobe Hooks	40	
Clothes Line Hooks	50	
Ceiling Hooks	50	
Hat and Coat Hooks	50	
School House Hooks	50	
Bird Cage Hooks	70	
Harness Hook Sets	60	
Harness Hooks	60	
Label Drawer Pulls	50	
Card Holders	50	
Drawer Pulls	50	
Sash Lifts	50	
Cash Barrel Bolts	50	
Card Racks	50	
New Book Rack	35	
Sash Props	50	
Frame Pulleys	40	
Solid Flangeless Pulleys	50	
Drum Pulleys	50	
Blind Hinges	75	
Alston's Surface Hinges	75	
Alston's Reversible Shutter Hinge	75	
Shelf Brackets	50	
Inside Shutter Fasteners	50	
Porch Post Irons	50	
Barn Door Hangers	50	
Barn Door Rail	60	
Wood Rail B. D. Hangers	50	
Cherry Hinges	50	
Carriage Wrenches	60	
Cyclops Wrenches	40	
Curry Combs	50	
Mane Combs	50	
Carriage Combs	50	
Hay Fork Pulleys	60	
Well Wheels	50	
Pump Fixtures	50	
Ceiling Ladders	50	
Wire Stretchers	50	
Quilts	65	
Dumb Bells	70	
Counter Legs	40	
Cess Pool Traps, No. 2	50	
Cess Pool Traps, No. 1	50	
Hydrant Cess Pool Bell Trap	50	
Hydrant Cess Pools	50	
Flue Dampers	60	
Flue Rings	40	
Oven Doors	40	
Hitching Posts	50	
Coal Car Wheels	40	
Farm Scales	25	
Tail Nuts	40	
Thumb Nuts	40	
Thumb Screws	40	

### CARRIAGE HARDWARE.

J. B. Savage, Southington, Conn., issues the following discount sheet of quotations adopted by the National Association of Carriage Hardware Manufacturers June 16, 1886; goods f.o.b. at Southington, with the intimation that there is positively no freight allowance. Goods marked with asterisk are subject to the pool rebates. The prices named are as follows:

	Dis.	per cent.
body Lamps, Single Lip, for 1/4 and 5-16 bolt, per doz.	5	
body Lamps, Single Lip, for 3/8 and 5-16 bolt, per doz.	10	
body Lamps, Double Lip, for 1/4 and 5-16 bolt, per doz.	10	
body Lamps, Flanged Lip, for 1/4 and 5-16 bolt, per doz.	10	
Bolts, Whitetree, T Head, with Spurs, per doz.	5	
Bolts, Whitetree, Bent Pattern, Black, per doz.	5	
Bolts, Shackle, milled, 2 1/2 per 100	5	
Clips, Buggy Saddle, per doz. sets, \$1.50	5	
Clips, Buggy Saddle, without top plates, per doz. sets, \$1.50	5	
Clips, Buggy Saddle, per doz. sets, \$2.25	5	
Clips, Short Spring, 5-16 stems, 75 cents; 3/8 stems, \$1	5	
Clips, Superior Axles, New List	70	65
Clips, Norway Axle	55	50
Clips, Norway Axle, "Heavy"	55	50
Clips, Norway Spring Bar	60	55
Shaft Couplings, unfinished	60	55
Pole Couplings, unfinished	55	50
Finished Shaft Couplings, 1/4 inch and 1 inch light, 50¢; 1 inch heavy, \$3.00; 1 1/4, \$4.50; 1 1/2, \$5.50	5	
Finished Pole Couplings, 1/4 and 1 inch light, \$3.00; 1 inch heavy, \$4.50; 1 1/4, \$5.50; 1 1/2, \$6.50	5	
Couplings, Parts, Clip Part, Standard Coupling Part List	60	55
Couplings, Parts, Shaft Eyes, Standard Coupling Part List	60	55
Pole Eyes	60	55
Couplings, Albany Pattern Sleigh, 1 inch light eye, per doz. pairs, \$2	5	
*Fifth Wheels	15	
Derby, No. 1	14.50	16.50
Derby, No. 2	14.00	16.00
Derby, No. 3	11.00	12.00
Derby, No. 4	11.00	12.00
Derby, No. 5	18.00	20.00
Derby, No. 6	14.50	16.50
Derby, No. 7	11.00	12.00
Derby, No. 8	10.50	11.50
Derby, No. 9	26.00	30.00
Brewster, No. 11	29.00	33.00
Cin. Lug, No. 12	18.00	20.00
Cin. Lug, No. 12 1/2	18.00	20.00
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Derby, No. 8	10.50	11.50
Derby, No. 9</		



the cheap square Stove says the only agreement was for every one to get what they could for their Stoves. Another says, if I sold any Stove at a cut price, the penalty would be that that price would be the association price for all stoves of that price for the season, or until a lower price was made. However, the price on association Stoves is very firm, even in competition with the cheaper Stoves. The convention met in Detroit, then went to Chicago, and finished. I am doubtful if as many Stoves will be sold as if the old price was retained or a cheaper one made. All consumers feel poor, and will make their old Stoves do, rather than pay an advanced price.

#### ARRANGEMENT OF HARDWARE STORES.

The following description relates to a Hardware store in Southern Illinois which is smaller than many the arrangement of which we have described, and will on that account be of the more interest to some of our readers. Our correspondents say in explanation of the accompanying diagram, Fig. 104:

Our store is of medium size. We carry a stock of between \$4000 and \$5000 worth of goods, and have it arranged to our satisfaction, and are told by traveling men that it compares very favorably with any in the country. Our building is 24 x 75, besides a small ware room in rear, our tin shop, 15 x 24, being in rear of the main building, leaving

Pans, Drip Pans, &c. On the top of cornice we put Coal Hods, Wash Boilers, Milk Buckets, &c. We make good use of show windows by displaying seasonable goods, changing them now and then. We always try to put bright goods in them, as they are more attractive. We do not crowd our windows, considering a bold display of a few articles more attractive. In the fall we display on Hardware side Guns, Axes, Crosscut Saws on the wall, changing to Axes, Hay Knives and Meat Cutters. A lot of Screws in gross boxes stacked up arched looks well. On the Tinware side we display such large goods as Bread and Cake Boxes, Toilet Sets, &c., filling balance of space out with Tea and Coffee Pots, &c.

Space I on Hardware side is used for small goods, such as Punches, Bull Rings, Rules, Gimlets, Sawsets, Screw Hooks and Eyes, Drill Bits, Sash Fasteners, Window Catches, Cupboard Catches, Brass Faucets, Compasses, Dividers, Calipers, &c. Section II contains Auger Bits, Files, Chisels, Handles, Screw Pulleys, Door and Foot Bolts, Chest Handles, &c. III, Pincers, Monkey Wrenches, Chisels, Augers, Sheep Shears, Coat and Hat Hooks, Drop Latches, Hasps, &c. IV, Screws in boxes 2 x 2 1/2 x 12 with brass knobs. These are kept on second shelf from ledge. Above Screws are Rivets and Burrs, Pad, Drawer and Wardrobe Locks, Iron Planes, Iron and Britannia Spoons, Door Locks, Casters, surplus stock of Files, &c. V, Hatchets, Shelf Brackets, Planes,

enormous amount of money that annually leaves this colony for these goods, simply because makers had not the "go" in them to come out and see what we wanted and ascertain the style and quality of the articles suited to us. Then, again, the exhibitions held from time to time in a certain measure opened our workshop doors, and now the very nations that depended entirely upon you for what they wanted are not only supplying their own wants, but are actually shoulder to shoulder with you in all the markets; and, what is more, their article is often better finished and cheaper. There is no sentiment in business. We should prefer to do business with you, but you must not ask us to take badly finished, old-fashioned goods, which, no matter how well they satisfied our forefathers, will not do for us. Would you be surprised to hear that no carpenter in New Zealand will use (from choice) an English Hammer, Saw, Brace or Auger Bit? No buggy-builder will use English Coach Bolts and Tire Bolts if American ones can be obtained, even at 10 per cent. more money than the English, because he can pick up a Yankee Bolt and apply it immediately to his work, and with its nice square-cut thread there is less chance of nuts becoming loose. What is the case with the English Bolt? He will search a gross over, and find every nut "jammed" so hard on the Bolt that it has to be taken to the vise and there oiled and eased. This takes time, and, as time is money, he cannot be blamed for preferring the

as it is almost 1 volt. The movement of the plate appears to keep the electromotive force more constant, although the cell has been supplying a current, than if the plate had been kept still.

#### Conductivity of Rosins.

It has been ascertained that the ordinarily perfect insulators of the resin type become more or less good electrical conductors when heated to softness or melting; afterward their conductivity increases with the temperature. A mixture of guaiacum with naphthalene, the latter a perfect insulator and of the same melting point as guaiacum, conducts much better than the resin alone, being much less viscous. Oxidized or acid constituents in the resin also increase their conductivity. Some always conduct very little, as Canada balsam, copal, mastic and dammar; Chios turpentine, pitch, asphalt, colophony, are moderately good conductors when soft or melted. Styrax, jalap, scammonin, dragon's blood, amber; the balsams of Peru, Tolu and copaiba; shellac, laudanum, aloes, myrrh, Venetian turpentine, are good conductors when melted.

#### The Highest Observatory in Europe.

German papers inform us of the erection of an observatory on the Sonnblick, one of the summits of the Tyrolean Alps, the highest elevations of which are the Grossglockner, the Wiesbachhorn and the Hohen Narn. Extensive glaciers and eternal snow, from which these giants rise, cover those almost inaccessible heights and their neighbors. The Sonnblick (Sun Glance) is a mountain nearly 10,000 feet high, the summit of which is less difficult of access, and where a house is now being erected which is to serve for meteorological observation. It will consequently be an observatory at the highest elevation in Europe—higher than that on Mount Etna, the Pic du Midi, in the Pyrenees, and on the Sents, canton of Appenzell. The first to draw the attention of meteorologists to this mountain as a suitable spot for an observatory was the owner of the Rauriser Goldberg, Mr. Rojacher. His private residence and mines are situated on the slopes of the Sonnblick, at an elevation of over 5000 feet, and from these a wire ropeway used for the purposes of the mines, but also practicable for passengers, leads up to a height of nearly 8000 feet. Here a house has been erected for about 20 miners, who reside there also during winter. Thence the summit of the mountain is reached by an easy ascent over a glacier in three hours. In descending, this portion may be traversed in low sledges in 15 minutes. The observatory now being erected on the summit, and which looks like a black spot when viewed from the Rauris Valley, and from which the Sonnblick rises like a precipitous wall 3000 feet high, consists of a blockhouse, flanked by a massive stone tower 40 feet high. To guard against the frightful storms raging round the summit, the walls of the tower are made of enormous thickness, while the blockhouse itself is anchored to the rock by stout wire ropes. Wood has been selected for the construction of the house, because it keeps out the cold better, which is most intense in that exposed spot in midwinter. The house contains two living-rooms—one for the resident observer, and another for those scientific men who may ascend in favorable weather with a view of carrying on experiments. The walls of the house are paneled inside, and neatly covered outside by wood shingles. The tower will be fitted with all the instruments used in meteorological observations. The observatory is protected not only by three lightning conductors, but also by a lightning-proof fencing. The solitary resident observer who has chosen to exile himself from the outer world is one of the 20 miners permanently residing in the miners' house, 8000 feet above the sea level, who is now undergoing a course of instruction in meteorology. But he will not be cut off entirely from intercourse with his kindred, for he will be able to keep up communication by telephone with the miners' house 2000 feet below him, whence another telephone wire, 15 miles long, leads to Rauris. From there his daily record of observations will be wired to Vienna, thence to be flashed to the scientific world generally.

tention being given to their various forms of upright drills. In addition we find illustrations and descriptions of lathes and lathe tools, sockets for drills and other appliances.

#### Pumping Machinery.

The Dean Brothers Steam Pump Works, of Indianapolis, Ind., have issued a new and attractive catalogue, in which they illustrate and describe their different types of pumps and pump attachments. Since their last catalogue was issued they have made many new and valuable improvements in their machinery. Among them they direct special attention to their noiseless valve gear, of which they furnish a sectional view, with a brief description.

#### Quartz-Mill Machinery.

A new catalogue devoted to quartz-mill machinery has just been sent us by the Joshua Hendy Machine Works, of San Francisco, Cal. It covers 88 pages, and contains a large number of illustrations, with interesting descriptions, of the various types of machines which they now build. Cuts and descriptions are also given of the Hurdy Gurdy form of water-wheel, with tables giving the effective powers which can be obtained under given conditions of use. Tables are also published for determining by rules the gold values of quartz in tons, or gravel in cubic yards, in a simple, practical manner. A special section of practical suggestions is added in which managers of mines, millwrights, amalgamators and millmen generally will find information of practical value.

#### Engines and Boilers.

A new catalogue has just been issued by the Erie City Iron Works, of Erie, Pa. It embraces 23 pages, and is profusely illustrated with engravings of their different types of stationary, portable and semi-portable engines and boilers. In every case brief descriptions are given, together with tables of sizes and capacities, and other particulars of interest to intending purchasers. The engravings are well executed, and the catalogue throughout gives evidence of careful preparation.

#### Steam and Hydraulic Machinery.

An extensive catalogue just issued by the Pond Engineering Co., of St. Louis, Mo., will be found to give a mass of interesting and valuable information relating to improved forms of steam and hydraulic machinery. It covers over 100 pages, and while the descriptive matter is necessarily in a condensed form it will be found none the less valuable to those interested in this line of machinery.

#### Wood-Workers' Tools.

We have received from Charles A. Strelinger & Co., Detroit, Mich., a copy of their new catalogue, entitled "Wood Worker's Tools, Supplies and Light Machinery." The book is comprised in 160 pages, pamphlet form, and is copiously illustrated with cuts of all the standard and special tools which the modern wood-worker is likely to require. The designs are accompanied by specifications of dimensions and a very comprehensive price list, thus making it possible to order from the firm issuing the book anything that cannot be found to equal advantage in local supply stores. To particularize or attempt to enumerate the goods described in this book would require more space than we can devote to the subject. Small machinery, including lathes, circular saws and various other devices, are included. This book gathers in convenient space nearly all of the standard tools and specialties which a very large number of manufacturers are producing. Accordingly its importance to the mechanic is not to be underrated. The book is accompanied by a very comprehensive index, facilitating reference to any part.

#### The Universal Tinker.

The Century Magazine for June prints the following circular letter, which is said to be a correct copy of a business document:

OFFICE OF THE UNIVERSAL TINKER, No. 1, 220 WALNUT STREET, KANSAS CITY, MO., 1896.

Dear Sir: Have you ever made an estimate of the amount of money you spend for repairs in and about your house and grounds? If not, do so, and see what a handsome sum it foots up for just one year. Now, add to this time lost in chasing plumbers, painters, gas-fitters, carpenters, &c., around to secure their needed services, and then you will be in a fitting frame of mind to listen to the proposal we are about to make you. We propose to take this annoyance and excessive expense off your hands. We will put your house in proper repair, and we will, for a small sum monthly, cause your house to be inspected and kept in a constant state of repair.

We will mend gas leaks. Put in window panes. Keep the waste and water pipes joint tight. Mend roof leaks, shingle, tin or shingle. Look after electric bells. Make periodical search for sewer gas. Silence creaking doors. Pack water-pipes and waste-pipes where the thorough plumber has left them to freeze. Jack-plane the edges of doors that won't shut. Fix window catches that now invite the festive burglar. Correct obstinate sash, so they slip up and down. Put a shelf here and there. Put on door-knobs; repair locks.

In fact, repair and put in shape all breakages and disorders that happen in and about your house, thus relieving you of all such annoyance and great expense.

Why can we do this work so much better and cheaper than others? Simply because we confine all these branches under one head.

We have The Carpenters, The Plumbers, The Gas-Fitters, The Steam-Fitters, The Painters, The Locksmiths, The Roofers.

And last, but not least, we have the veritable Tinker himself, who can mend anything, from a smoky chimney down to a hole in the cellar bottom.

Just think of it—trusty and expert men in all branches, subject to telephone orders. Call us for all repairs and for estimates on any new work you may want. Try the thing and see how it works.

Yours respectfully,

THE UNIVERSAL TINKER CO.

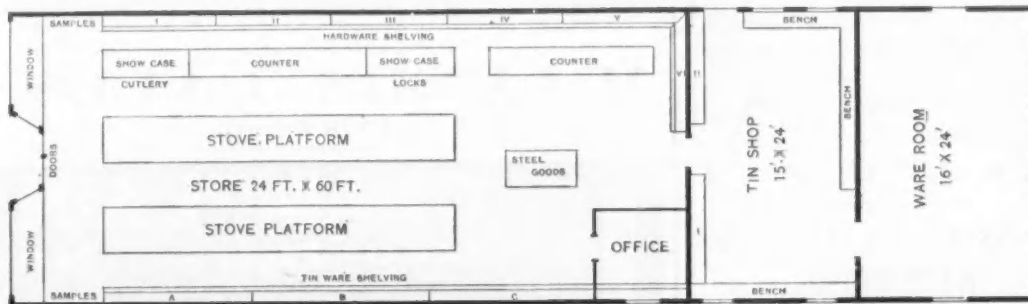


Fig. 104.—Diagram of Store.

ing the storeroom 24 x 60, the ceiling being 13 feet 6 inches high. Have glass front door in middle, set back 3 feet, with a showcase on either side. The shelving commences 5 feet back of showcases, which space on the Hardware side is occupied by a board covered with black cloth and molding around it, on which we display Hand Saws, Hatchets, Hammers and Steel Squares hung on bright wire hooks. They are thus easy to sell from. We sell the samples and replace them at our convenience. To the height of 3 feet the shelving is 18 inches deep, with a 6-inch washboard to prevent the dirt from getting under shelf. Above this the shelving are 12 inches deep, 7 inches between shelves, there being seven shelves up to the cornice. The latter is bold, and used for light and bulky goods. For one-half of the shelving we have wooden boxes made of assorted sizes to suit the goods. We prefer them to doors. They look well with the samples on, and keep goods in good order. On the lower shelf above the ledge we have boxes of uniform size, 3 1/2 x 12 inches deep, with small drawer pulls. In this we keep broken packages of Tacks, Nuts, Washers and Bolts. For Screws we

Levels, Hand Saws, Hammers, Brushes, Coffee Mills, &c. Below the ledge we have three shelves. The upper at front is used for Butts, Straps, Auger, Hatchet and Saw Handles, Picks and Mattocks, Sandpaper, Sad Irons, &c., in succession to the rear. The second shelf contains Blind Butts, Wire Brads in full packages, Tacks and Clout Nails in full packages, Washers, Nuts in full packages, Strap and T Hinges, Door Hangers, Lag Bolts, Grindstone Fixtures, &c. The lower shelf is used for Bolts half-way, the balance being devoted to Window Weights, Strap Hinges, &c. We commence with Tire and Flaw Bolts, the smallest size next to the front; Carriage Bolts, commencing with 1/2 x 1 1/4 up to 1/2 x 18 inch. Section VI is shelving across the back, 11 feet long, 3 feet high, 18 inches deep, partitioned off into 12 inch spaces, used for 1/2 Bolts, Clevises, Harrow Teeth and surplus stock of 1/2 inch Bolts. On the Tinware side A is for small Tinware, shelves 8 inches apart, such as Tea and Coffee Strainers, Oil Cans, Pie Plates, Muffin Pans, &c. B, shelves 12 inches apart for Granite Ironware. C, for a general line of Tinware. We make it a point to have the smaller goods near the front and increase the size of the goods as we go to the rear.

I in Tinshop is a bench with partitions to hold Tin Plate. It is a bench with shelves for Sheet Iron. Have three workbenches, as noted. The office is in rear of store, as represented. A window on the Tinware side of building gives all the light necessary. In the rear across the store we have a shelf on brackets the height of cornice and running clear across to hold surplus stock. Below it we have Well and Pump Chain, Steel Traps, &c., hung on heavy coat and hat hooks. A door in the center goes into Tinshop. We put Stoves on platform, but think we shall use for Cook Stoves stove trucks. A Stove can then be wheeled anywhere, and if sold taken directly out of doors and loaded without first handling it inside of store.

#### AMERICAN TRADE WITH NEW ZEALAND.

The following letter from a gentleman engaged in the Hardware business in New Zealand appears in a recent issue of the London Ironmonger. Our readers will observe that in it the correspondent sounds a note of alarm to English manufacturers on account of the increasing encroachments of American manufacturers in that field, and will note with interest that several lines of goods are referred to, with the remark that those of American make are regarded with more favor than the English:

I have read with much interest the various "leaders" and letters that have appeared in it referring to American trade with this colony. I do not know that I can throw any additional light upon what has been said on the subject, but if I can rouse the English manufacturers to a sense of their precarious position my letter will not have been written in vain. As I am engaged in the Hardware trade my remarks will be the result of my own actual experience. I shall not touch upon the American Axe question more than to say that the loss of trade to England is through sending rubbish out at first; and not caring to be gulled by our own kith and kin, who ought to have known better, we went elsewhere for what we wanted, "and got it." If Yates & Co. and Richard Thomas think the game worth the candle the trade may be won back to those it never ought to have left; but they must be prepared to run the Yankees for some time and work for little or no profit. With regard to quality, I am quite sure any article we are now using from America can be made at home as cheap or cheaper. I inclose a list, though incomplete, of some of the goods imported from America, and people at home have no conception of the

Yankee article. There are three enterprising Sheffield firms who are doing their best to get the trade back in long-handle Shovels, Hand Saws and Claw Hammers, and, if they persevere, I can predict the success they deserve. This success can only be obtained by manufacturers striking out a line for themselves, and having their properly-qualified agents out here to push their goods and be always on the spot showing samples, and for the agent to keep them posted up in all the requirements of the colony.

#### SCIENTIFIC AND TECHNICAL.

##### A Pocket Heliograph.

A pocket heliograph or optic signaler has been brought out by Dr. E. Gavoy, and introduced into the French military telegraph staff by the Minister of War. It consists of two copper tubes of 5 cm. in diameter, sliding one within the other. The upper tube carries a plain mirror, inclined at an angle, and throwing off the light of a lamp, or the sun reflected up to it from an adjustable mirror in the lower tube. The light thus thrown off passes along a short tube at right angles to the upper part of the main tube, and in doing so traverses two lenses, one plano-convex the other double convex. Between these two lenses is an adjustable shutter by which the rays are occulted so as to make the signals. An oil lamp, with reflector to throw its rays on the lower mirror, is added to the apparatus in such a way that it shuts up within the lower mirror. A lunette to indicate the path of the rays through the air to the distant observers is also fitted to the top of the apparatus. According to trials recently made in the park of Versailles, the apparatus worked satisfactorily over distances of from 1000 to 1200 m.

##### Magnesia in Portland Cement.

For a long time magnesia has been supposed to have a bad influence when present in cements, and, according to Engineering, M. Lechartier has been investigating the nature and cause of its action in structures built with cement, such as basins, dams and retaining walls, either exposed to air or water. These structures were built by competent engineers in different localities. The cements used did not contain sulphate of lime in a harmful proportion; they had a proper density and were made of good sands. Nevertheless, in all cases the effects were the same, and a slow destruction of the cement went on with time. The explanation of the facts arrived at by M. Lechartier is that the cements employed were really mixtures of Portland cement with magnesia, which behaved at first as inert substances, but little by little the magnesia became hydrated, producing expansion of the mortar and the deterioration of the works. St. Clair Deville has shown that pure magnesia without admixture of silica and alumina can combine with water to form a hydrate of great hardness, but the formation is accompanied by increase of volume. Portland cement alone contains but a small proportion of magnesia. M. Lechartier further observes that the increase of volume of the mortar takes place more rapidly when the water gains access more readily to the mass. Hence the business of fountains, reservoir walls, and so on, are affected in a comparatively short time.

##### A New Constant Cell.

A voltaic cell recently devised in England is claimed to be worthy of being considered a constant cell. It consists of a cadmium plate and a platinum plate, the exciting solution being of cadmium iodide with free iodine in it. The cadmium plate was however, revolved in the solution by clockwork at the rate of two or three revolutions per second. The electromotive force of the combination was about 1.076 volts. This is a convenient value for practical purposes,

#### TRADE PUBLICATIONS.

##### Alarm Gauges.

The Reliance Gauge Co., of Cleveland, Ohio, have issued a neat little catalogue in which they describe at some length their Reliance alarm gauges, which have been on the market for some time past. General and sectional views are given, together with directions for attaching to steam boilers, price lists and other matters of general interest. Boiler owners will find the pamphlet to contain a number of things deserving attention.

##### Horse-Powers.

The St. Albans Foundry, of St. Albans, Vt., send us a catalogue in which they illustrate and describe their various forms of horse-powers. The catalogue embraces 36 pages and supplies descriptions and extensive price lists. The manufacturers announce that they have recently purchased from Mr. B. L. Olds all his different horse-power patents, speed regulators, &c., and have thus become the sole owners and manufacturers of these machines throughout the United States. Many improvements have recently been made in the machines, to which reference is made in the catalogue.

##### Electrical Apparatus.

A. K. Eaton, of Brooklyn, N. Y., sends us a catalogue in which he illustrates and describes at some length his instruments for electrical measurement, prisms, spectroscopes, telescopes, microscopes, &c. Tables of prices are added, together with a long descriptive list of various devices of his manufacture.

##### Machinists' Tools.

Prentice Bros., of Worcester, Mass., have just sent us a neat little catalogue, which will be found interesting in many respects. It is devoted to machinists' tools, special at-

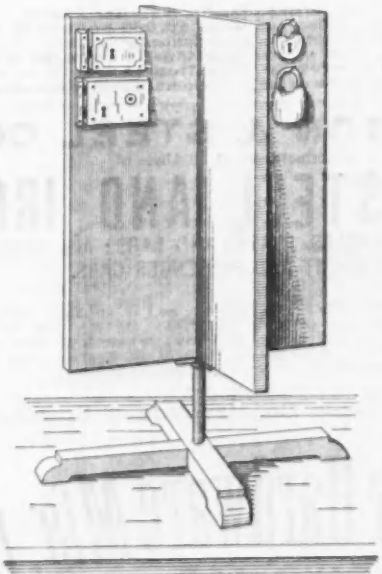


Fig. 105.—Sample Stand.

have smaller boxes with small brass knobs for pulls. Nails we keep under the counter in bins similar to others which have been described. An 8-foot showcase near the front contains Pocket Knives, Shears, Knives and Forks, and Silver-Plated Spoons. The showcase further back contains Mechanical Tools. For Door, Pad and Drawer Locks we have a stand, Fig. 105, made out of four pieces of walnut set at right angles and revolving on a center pin. This gives us eight sides for samples. We like it better than anything we ever saw for the purpose. Costs \$2. Drawer, Door and Wardrobe Locks are screwed to it, and Padlocks are hung on brass hooks. Each has a tag stating price and number. We sell all the samples and never have to take down any other boxes beside what are wanted.

For Steel Goods we have a rack similar to an open counter you described some time ago. It is 8 x 4 and 3 feet high, and has 20 partitions, and is used for Hoes, Hay and Manure forks and Rakes with the handles down, and for Spades, Shovels and Scoops with handles up. It does not look very attractive on account of the different lengths of handles, but it holds a lot of goods.

The shelving for Tinware is the same as for Hardware, only the spaces between the shelves are made to fit the ware. Below ledge we keep Hollow-ware, Skillets, Fry







## MECHANICAL.

## Centrifugal vs. Reciprocating Pumps.

Mr. William O. Webber's paper on "The Relative Efficiency of Centrifugal and Reciprocating Pumps," presented at the recent meeting of the American Society of Mechanical Engineers, at Chicago, contains information of value to all interested in pumping machinery. Accordingly, we take from it the following particulars:

Until quite recently very little has been done to perfect centrifugal pumping machinery in the United States. There are no well-authenticated experiments recorded by American engineers containing all the necessary data for comparison with other types. The situation in Europe is better; in 1883 pumps constructed on the Gwynne system gave under a lift of 14.7 feet an efficiency of 61.3 per cent. of useful effect. The term "efficiency" here used indicates the value of

$$\frac{W. H. P.}{I. H. P.}$$

and does not therefore show the full efficiency of the pump, but that of the combined pump and engine. It is, however, a very simple way of showing the relative values of different kinds of pumping engines having their motive-power forming a part of the plant. Several diagrams have been prepared illustrating this subject, which are presented as representing the results of experiments made with the two types of engines which are being considered. It may be of interest to insert here the following description of the testing apparatus used by Mr. Webber in determining the efficiency of the belted centrifugal pumps.

Referring to Fig. 1, *a* is a pump in position to be tested, and is bolted down to the floor over the tank *g*; *o* is the strainer on lower end of suction-pipe; *n* is the gate-valve in the discharge-pipe, to be closed when using the injector *k* in exhausting the air from the pump, so as to prime it; a taper expander, *i*, is used on the discharge-pipe, tapering from 5 to 6 inches, this being found to act something like a taper draft tube on a water-wheel, increasing the efficiency of pumps so connected from 2 to 5 per cent.; the pipes *j* and *j'* are wrought-iron tubing, such as ordinarily used in piping, and the elbows *k* are the long turn elbows especially designed for automatic sprinkler purposes, and are used here in preference to ordinary elbows, owing to the great loss of power in driving water around such short corners.

The power being used is transmitted by the counter-shaft *f* from the main line to the balance transmitting dynamometer *b*, which carefully weighs the power being used by the pump *a*. The water being pumped from the tank *g* passes up through the piping *j* and *j'*, and is delivered into the diffusing-box *c*, where its velocity is retarded, and the solid round stream is broken up and spread out into a thin sheet by the inclined shelves shown in dotted lines, and the water then delivered in a broad sheet, but with the velocity due only to its own weight in falling into the weir-box *e*, at the front end of which is the weir proper *c*, having an opening of 48 inches in width, and a depth of water below the crest of the weir equal to three times that of the stream flowing over it. At the proper distance back from the crest is the hook gauge *d* for measuring the depth, and still further back are the smoothing racks *l* to retard and quiet the flow of water. In making a test, after exhausting the air and starting the pump the valve *n* is opened and water is discharged in a continuous stream through the pipes into the weir-box *e*, and then falls again in a sheet into the tank *g*, and is thus pumped over and over.

In calculating the efficiency of pump the cubic feet of water passing over weir, measured by the hook gauge, being converted into pounds by multiplying by 62.5, is again multiplied by the height from level of water in tank *g* when the pump is running to the center of the horizontal discharge-pipe *j* at top of testroom, and the foot-pounds so obtained divided by 33,000 equals the water horse-power being developed. The power used to do this work is measured by the dynamometer, and (minus the friction of the dynamometer itself, which is in every test weighed and deducted,) equals the dynamometer horse-power; the water horse-power being divided by the dynamometer horse-power equals the efficiency of the pump being tested, or to formulate:

$$\frac{W. H. P.}{D. H. P.} = E, \%$$

Fig. 2 was prepared by plotting the values of  $\frac{W. H. P.}{I. H. P.}$  as found in the various tests made to determine the duty of some of the best designed reciprocating pumping engines of bucket and plunger, piston type, &c. The highest value of this term with which Mr. Webber is familiar is 0.9164 for a lift of 170 feet, and 3615 gallons per minute. This was obtained in a test of the Leavitt pumping engine at Lawrence, Mass., July 24, 1879, made by Richard H. Buel, C. E., the following being the results obtained during the duty trial:

Duration of trial	15.1 hours
Pounds of wood used to start fires	400
Of coal put into furnaces	3500
Of coal withdrawn from furnaces at end of trial	27
Of coal consumed, (4000 x 0.4) + (3500 - 27) =	1,603
Pressure in main, by gauge	64 lb. per sq. in.
Water level in well below gauge	29.05 feet
Water pressure, (29.05 x 0.435) + 64 =	76.6 lb. per sq. in.
Area of pump bucket	586.0465 sq. in.
Revolutions of engine	12,387
Duty of engine, (586.0465 x 12,387 x 76.6 x 100) =	551,548,925
Average revolutions per minute	18.62
Suction pressure by gauge	80.5 lb. per sq. in.
Vacuum, inches	27.4 in.
Barometer, inches	29.81
Temperature of engine-room	79°
Temperature of feed-water	119°
Temperature of fine	328°
Total quantities: For 45 of coal	3,503
Pounds of ashes	225
Pounds of combustibles	3,410

\* In order to avoid confounding the tests of two types of pumps—*i. e.*, those coupled direct to engine and those driven by belt—the expressions  $\frac{W. H. P.}{I. H. P.} = E$  will be used for the former, and  $\frac{W. H. P.}{D. H. P.} = E'$  for the latter.

Pounds of feed-water	26,800
U. S. gallons of water pumped per 24 hours, calculated from pump capacity	4,401,272
Per cent. of ashes	6.14
Hourly quantities: Pounds of coal	241
Pounds of combustibles	230
Pounds of coal per sq. ft. of grate	8.38
Pounds of combustible per do.	7.86
Pounds of heating surface per do.	0.236
Pounds of combustible per do.	0.222
Pounds of feed-water	2,457
Evaporation: Pounds of water per pound of coal, at observed temperature and pressure	10.13
Per pound of combustible do.	10.79
Per sq. ft. of heating surface per hour do.	2.39

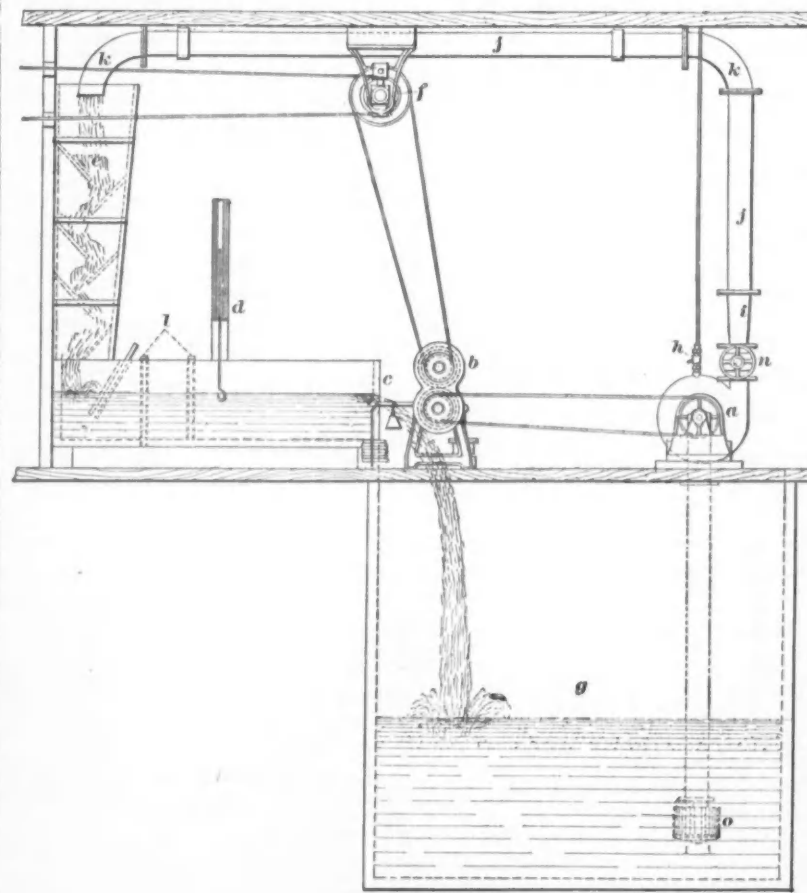


Fig. 1.—Arrangement of Testing Apparatus.

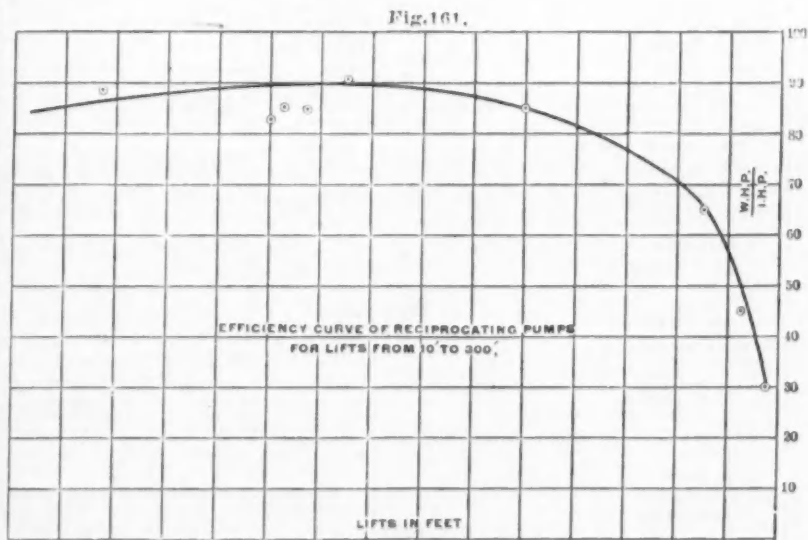


Fig. 2.

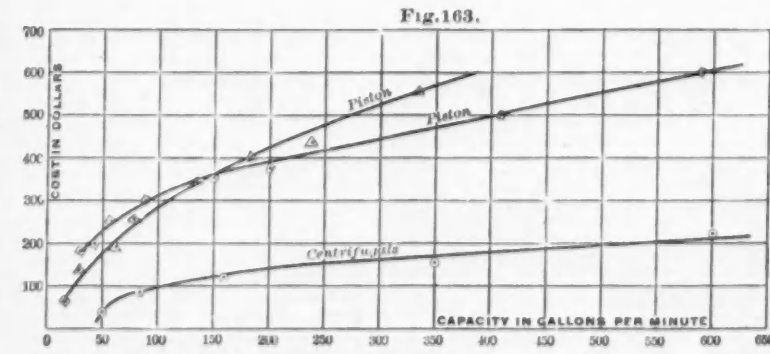


Fig. 3.

Figs. 2, 3, 4 and 5.—Diagrams of the Relative Efficiency and Price of the Two Types of Pumps.

## THE RELATIVE EFFICIENCY OF CENTRIFUGAL AND RECIPROCATING PUMPS, FROM EXPERIMENTS BY W. O. WEBBER.

Per pound of coal from and at 212°	11.49
Per pound of combustible per do.	12.24
Per sq. ft. of heating surface per hour do.	2.71
Horse-power: Net (calculated from water pressure)	125.55
Indicated (0.91648 x 147.9)	147.91
Pounds of coal and water per hour per horse-power	1.78
Per indicated horse-power	1.78
Feed-water, per net horse-power	17.98
Per indicated horse-power	16.48

For higher lifts than 170 feet the curve of efficiencies falls, and from 200 to 300 feet lift the average value seems to be about 0.84 per cent. Below 170 feet the curve also falls reversely and slowly, until at about 90 feet its descent becomes more rapid, and at 35 feet 0.727 appears the best recorded performance. There are not any very satisfactory records below this lift, but some figures are given for the yearly coal consumption and total number of gallons pumped by engines in Holland under a 16-foot lift from which an efficiency of 0.44 has been deduced. An interesting collection of information was published in 1883 by an Italian engineer, Signor Cupperi, concerning pumping engines in Holland, which will be found useful in this branch of hydraulics.

Fig. 3 contains two curves, one transferred from Fig. 2, on a different scale; the

other the result of tests made with centrifugal pumps. As in the first type considered, there is a lift at which we find centrifugal pumps giving a maximum efficiency, while for lifts above or below this the efficiency decreases. The lift at which the maximum efficiency is obtained in the latter case is approximately 17 feet. At lifts from 12 to 18 feet some makers of large experience claim now to obtain from 65 to 70 per cent. of useful effect. As already stated, 0.613 is at present the best done at a public test

pumps at high lifts is because the first factor is so large a proportion of the work done, for if a certain number of gallons is to be raised in a given time to a given height our only hope for high efficiencies lies in making the friction of the water through pipes and pump, as well as the friction of the pump itself, a minimum. Here is where a change in style of pump on low lifts is taking place. The water in passing through or passing over the disk of a centrifugal pump meets with almost no resistance in the shape of valves to be opened, corners to be turned sharply and contracted passages, so often found in the common piston pump. Again, the friction of the pump itself is confined entirely to what is generated by the revolving shaft in two or sometimes three bearings, and it is well known that a revolving shaft is the most easily lubricated of any form of bearings. Again, the friction of motion being less than that of rest, a slight advantage seems to be gained in the continually revolving shafts over the stops and starts of a reciprocating pump. Besides this, there is also to be considered the subject of shocks and jars of large masses of water moving at variable velocities, as well as the freedom from an air cushion on the piston in a centrifugal pump. These are some of the more important reasons to account for what we find to exist, namely, that for lifts up to 34 feet water can be handled more efficiently by centrifugal than by piston pumps. There is this point which may be worth considering in connection with the point at which the curves of efficiencies cross. It appears to correspond with the head of water which is supported by the atmospheric pressure, and it has been suggested that centrifugal pumps will give higher efficiencies than piston pumps just as long as they can depend upon the help of the atmosphere, but when this help is not available a direct push seems the proper thing.

Having considered thus far the comparative value of the two types from the efficiencies alone, we might now look at some other points of importance to the user of any apparatus for raising fluids. Under this head we shall consider the following subjects: 1, comparative weights; 2, first cost; 3, annual costs; 4, ease in handling. The drainage pumps constructed some years ago for the Harlem Lake were designed to lift 70 tons per minute 15 feet, and they weighed about 150 tons. Centrifugal pumps for the same work weigh only 5 tons. The weight of a centrifugal pump and engine to lift 10,000 gallons per minute 35 feet high is

000,000 gallons per 24 hours, on a mean lift of about 10 feet (maximum of 12.5 feet).

The diagrams of Fig. 3 dispose of the third item, while the last items are surely not greater than for piston pumps. It is fair to say that Fig. 4, showing relative prices of the two types of pumps, includes only pumps of each type up to a capacity of 600 gallons per minute, and were plotted out direct from catalogues of well-known makers of each style. The writer not having access to any reliable data of time performances of direct-action steam pumps generally in use for tank and similar work, can make no graphical comparison between these and centrifugal pumps. Having made some 70 or 80 experiments on efficiencies of centrifugals, lifts from 5 to 50 feet, and capacities from 50 to 1500 gallons per minute, measured by a dynamometer, it would be very useful to have some information concerning the former class for comparison in the smaller sizes, and we would be glad to see some published reliable results under this head.

Fig. 5 shows two efficiency curves for different velocities, plotted from tests made of two pumps with 5-inch discharge apertures. These tests were made under an average elevation of 17 feet, the pumps in both cases drafting about 9 feet and discharging 8 feet higher. The upper curve *a b* was the result of tests made by a pump that was very clean and smooth inside. The lower curve *c d* was made by a pump in which, through carelessness in the foundry, the core-sand had been allowed to burn into the inside face of volute or casing and water passages. The difference between these two curves (which, by the way, are remarkably uniform) shows the absolute necessity of having the inside of all such pump castings very smooth and free from the slightest roughness. Both of these pumps were taken at random from stock, and were in no wise especially prepared for these tests. These tests seem to show that the efficiency rises very gradually and uniformly until the water reaches a velocity equal to 11½ feet per second. The highest efficiency with this size pump seemed to equal a velocity of 12 feet per second, after passing which point the efficiency falls very rapidly.

Mr. Webber has other series of tests in progress, not quite completed, which he proposes to embody in another paper on "Centrifugal Pump Efficiencies," which seem to show that the efficiency of centrifugal pumps increases as the size of the pump increases, and which might be approximately stated as follows: That a 2 inch pump—this

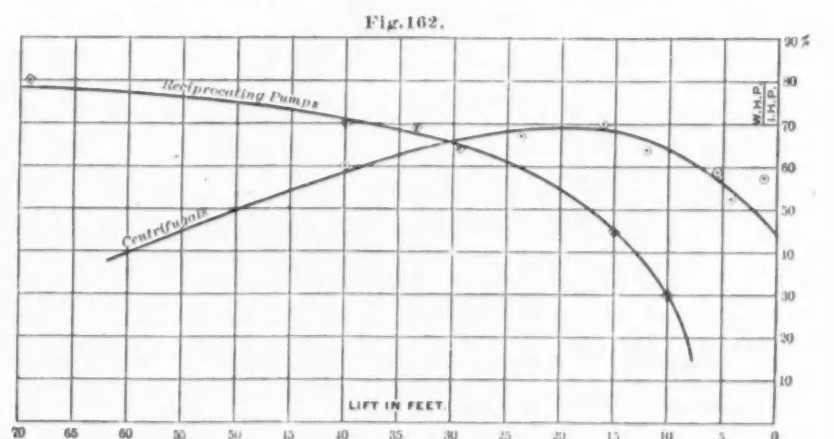


Fig. 4.

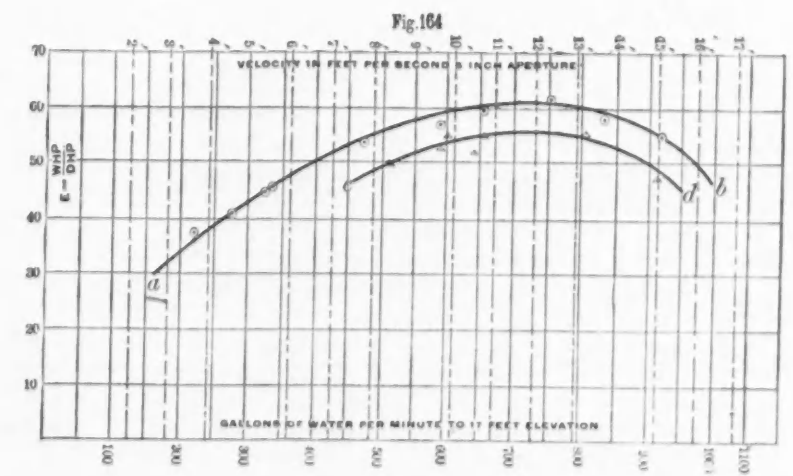


Fig. 5.

6 tons. This lift is the same that the Boston Sewage System station pump is at work against; but the latter capacity is double the 10,000 gallons per minute, and the proportionate weight for a centrifugal pump would be 12 tons. We have not at hand the actual weight of the Boston pump, but it must be many times 12 tons.

Fig. 4 shows the relation between the two types as regards the prices, the upper two curves showing the prices of piston pumps to raise different amounts of water. The lower line gives the same for centrifugal pumps, from which we deduce this approximation: first cost of centrifugal pump = 0.4 first cost of piston pumps for the same duty. The annual costs include several items, the more important of which are: 1, interest on investment; 2, depreciation in value; 3, heat-units used up in running pump per hour; 4, oil, care, repairs, &c. For low lifts up to 40 feet each above item is lower for the centrifugal pump. The pumps placed by Gwynne at the Ferrara Marshes, Northern Italy, in 1865, are still in working order, and seem good for a long time to come. These pumps are probably capable of handling more water than any other set of pumping engines in existence. The work performed by these pumps is the lifting of 2000 tons per minute, over 600,

designation meaning always the size of discharge outlet in inches of diameter—giving an efficiency of 38 per cent., a 3 inch pump giving 45 per cent., and a 4-inch pump giving 52 per cent., were giving as good results proportionally as a 5-inch pump at 60 per cent. and a 6-inch pump at 64 per cent. of efficiency.

## Heating Surface in Boilers.

Buying a boiler which figures up largely in heating surface is one thing, and getting good evaporative results from this surface is quite another thing. It was supposed by many persons some years back (and is supposed yet by some) that the more tubes you could crowd into a steam boiler the better "steamer" it would be; but time and experience have proved to manufacturers that free circulation of water in the boiler is much more important. It has been proved repeatedly that boilers having from six to ten tubes less than others, with a good open space in the center of the cluster of tubes and also ample space between the tubes and shell of the boiler, evaporated more water per pound of coal, besides giving good room for cleaning and a freedom from expensive repairs. Practical illustrations bearing out the truth of this are not uncommon and have frequently taught good lessons.











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### Comparisons of Blast Furnace Records.\*

The present paper is merely a continuation of the discussion upon the former one, "The Operation of the Warwick Furnace from August 27, 1880, to September 1, 1885," and is intended more as an opening of the renewed discussion than as an independent paper. Naturally, those acquainted with the physical condition of the ore used at Warwick Furnace generally attribute the "dirt troubles" to comminuted stock. But, as explained in Mr. Cook's discussion of the paper, no material amelioration of the annoyance resulted from the employment of coarse ore. Few iron ores are charged into blast furnaces which do not, in handling from the stock piles to the top of the stack, dumping upon the bell or into the furnace, or descending through the shaft of the furnace, produce more or less fine ore; and it is possible that, in some of the softer ores used at Warwick Furnace, the amount of such finely-divided ore was greater than usual, but that it was not sufficiently so to make this particular furnace an exception to all others in the neighborhood is hardly debatable. Nor was the proportion of small ore as great as is charged into other American blast furnaces. Anthracite coal, too, loses some sharp angles by attrition, and when subjected to sudden changes of temperature decrepitate, the various qualities differing in the degree of decrepitation. But, as the coal used at Warwick Furnace was of medium hardness, this should not have a material bearing upon the "dirt troubles." Neither is it probable that the change in stock, traveling so that its temperature would not be raised at most over 200° F. per hour, would cause such decrepitation as would be sufficient to rapidly destroy the coal. Besides, other furnaces using similar stock consumed fully as much fuel, although perhaps with smaller output, without the annoyance caused at Warwick Furnace.

At some of the furnaces using fine Cornwall ore troubles from dirt accumulation occur periodically with remarkable uniformity as to time. One manager informs me that these disturbances could be expected every 10 or 15 days, and the cinder notch invented by Mr. H. C. Grittinger was designed largely for the removal of this accumulated material.† This, however, may possibly be owing as much to the distribution of stock at the tunnel-head as to anything else, and does not necessarily follow lower fuel consumption.

As the physical value of the various fuels for blast furnaces appears to be proportionate to the surface exposed, it is possible that any decrepitation would work advantageously, rather than the reverse, by exposing a greater amount of surface to the oxygen of the blast. There does not seem sufficient testimony offered to sustain a theory that fine ore or coal, or both combined, caused the dirt troubles mentioned at Warwick Furnace; and, while giving full consideration to the possibility of these augmenting the trouble, they are not accepted as the only causes. Another theory advanced is that in working upon low fuel consumption the practical limit of fuel economy was approached, and, in so doing the reduced ore, as fine powder, gradually sank as the column of fuel was lessened, until this reduced ore, at a high temperature, met the oxygen in the blast near the tuyeres and was reoxidized, producing an infusible material, clogging the hearth and reducing its temperature by sudden slips. That the reduced ore appears at the lower part of the boshes as sand seems satisfactorily determined. It may be assumed that a column of incandescent solid fuel exists at the tuyeres through which the metal and cinder drop from the reduced ore. This ore, in normal working, may be at a considerable distance above the tuyeres, but when operating with low fuel this zone of reduced ore may approach closer and closer to the tuyeres, and the trouble may be continually augmenting until reoxidation takes place from a direct or nearly direct contact with the blast of the reduced ore raised to a high temperature.

The necessity of thorough and careful distribution of stock is too little appreciated; and there is no doubt that many disturbances in furnace operation arise from imperfect charging. The relative diameters of bell and stock line are not matters of minor importance; but it is probable that many furnaces suffer from the fact that the stock line has been considered as the point in the shaft of the furnace which the stock reaches when the charge is completed, and the proportion is based upon this. This line is ordinarily a considerable distance above the point where the first part of the charge is dropped; and it would appear more important to proportion the bell to the line of stock when the furnace is sufficiently settled to receive a charge than to the line of stock when the charge is completed. Another cause of disturbance is in the relation which the volume of charge bears to the greatest diameter, and it would appear as essential either to drop all stock thoroughly intermixed or else in such layers as would approximately hold their relative positions in descending through the furnace. If the charge of fuel were sufficient to cover, to a depth of 1 foot, a stock line 12 feet in diameter, its volume would give a layer of 6.7 inches thick at a bosh diameter of 16 feet; and, with no allowance for waste, would bring to the tuyeres in a crucible 9 feet diameter a column of fuel 2½ inches in depth. In many cases the size of the fuel used and the cubic contents of a charge are such that, even if a layer of fuel was distributed with practical uniformity at the tunnel-head, it would be insufficient for a layer at the bosh, and would hence necessitate unequal distribution.

\* From a paper read at the Bethlehem meeting of the American Institute of Mining Engineers, by John Birkinbine, Philadelphia, Pa.  
† The Grittinger cinder-cap consists of an opening closed by a hinged door which, when opened, gives a vent of large area (about 100 square inches), and the practice at the North Cornwall Furnace, which is under the inventor's management, is to blow into the cinder for an hour after it rises to the tuyeres. This demands high blast pressure, and is attended with more or less risk in case of sudden stoppage of blast; but the assistance thus given in the removal of any accumulation of undecomposed material which obstructs the crucible is deemed a compensation.

The theory of disturbance of the equilibrium, if it may be so expressed, in furnace proportion by the increase in areas from the tuyeres to bosh more rapidly than above the bosh was presented fully by Mr. Cook, and any elaboration of it should in fairness be left to him. Another theory advanced is that the dirt troubles are due to scaffolds. If a scaffold is material adhering or fused to the walls it is not necessarily connected with the dirt troubles described; but if a scaffold is interpreted as an accumulation on the walls, then the dirt troubles accompanied scaffolds. But to admit the latter definition would be to assert that a majority of blast furnaces are scaffolded, and that those which are producing the most satisfactory results are accomplishing their work with scaffolds, for few furnaces are free from a deposit of carbonaceous or other material when in operation, which acts as a refractory lining superior to any artificial composition in use. By reference to the record of the long blast at Warwick Furnace it will be noted that in May, 1882, the thin walls threatened to require putting the furnace out of blast, but that it made its own repairs and continued in operation until September, 1885, when on blowing out the available thickness of the fire brick walls was but 4½ inches, the accumulated material which laid against them or which formerly may have been adhering to the walls having formed a refractory lining. This experience at Warwick Furnace is not unique. Other furnaces have been able to continue in successful operation by reason of an accumulation protecting the brick-work long after the necessity of blowing out had been deemed imminent.

The record presented in the operation of the Warwick Furnace very properly encourages comparisons with results obtained at other plants, differing in dimensions, in ores or fuels used and in the temperature of blast employed, and the general verdict is that even better results would have been obtained had the furnace been higher or of greater cubic contents, or had richer ores been used, or had coke alone been employed, or had the temperature of blast been higher—any of the above conditions being usually considered as advantageous, and all combined as adding materially to the output and largely augmenting the economy of the operation. Without desiring to question the value of increased height within reasonable limits, I think sufficient practical data are not at hand to demonstrate the superiority of very large furnaces over those of moderate dimensions, although that superiority may be theoretically argued. Other things being equal, a rich ore will naturally improve the yield of the furnace and increase its economical operation, and with richer ores and a higher stack it is not unfair to prophesy even better results than were obtained in the Warwick Furnace. This would seem evident from the following published record of the furnace of the Ohio Iron Co., at Zanesville, Ohio.

The figures cover two campaigns—one of 46 weeks, from June 2, 1882, to May 19, 1883, with the furnace 59 feet high by 13 feet bosh, making 19,495 tons, and the other 26 weeks, from February 4, 1885, to August 11, 1885, with the furnace enlarged to 75 feet high by 15 feet 6 inches bosh, making 16,913 tons of pig iron:

Dimensions, &c.	Old.	Enlarged.
Height of furnace	59'	75'
Diameter of bosh	13'	15' 6"
Diameter of hearth	8'	8'
Height of tuyeres above floor	5' 6"	5' 6"
No. of tuyeres	5	5
Diam. of nozzles	5½"	5½"
Diameter of bell	4' 9"	4' 9"
Diam. at stock line	10' 6"	11'
Three Whitwell stoves	17' x 65"	17' x 65"
Average temperature of blast	1400° F.	1400° F.
Two engines, steam cylinder	32" x 60"	32" x 60"
Blast cylinder	72" x 90"	72" x 90"
Average amount of iron made per day	60.54 tons.	92.93 tons.
Fuel consumption per ton iron:		
50.70 coke	73	
22.30 coal	bush.	2920 lb.
Fuel consumption per ton iron:		
48.75 coke	55.21	
12.46 coal	bush.	2308 lb.
Yield of ore mixture	55.43 per cent.	59.70 per cent.
Limestone per ton iron	1 ton.	0.51 ton.
Best week's run	548 tons, 236 lb.	758 tons, 516 lb.
Fuel per ton in heat week	2330 lb.	1860 lb.

In the above calculation 1 bushel of coal of 80 pounds is taken as equal to 1 bushel of coal of 40 pounds. The weights given are therefore calculated coke equivalents, and the actual weights charged were 3812 pounds with the low furnace and 2707 pounds with the new shape. How much of the increased yield or lower fuel consumption is due to the richer ore, to the changed proportions of the furnace other than height, to the general repair and improvement which ordinarily accompanies remodeling, or to the advance in practice during two years of business depression, it is impossible to determine. In both campaigns the amount of mill cinder was about the same, say 25 per cent., but in the first blast another 25 per cent was native carbonate ores, carrying high silica. The ore mixture only yielded 55.43 per cent., as against 59.70; it was also more silicious, both from the nature of the material used and as is evidenced by the higher lime required. This was one cause of the larger fuel consumption. In the last blast about 25 per cent was mill cinder, and the balance was made up of Lake Superior ores, with the exception of some 2700 tons of magnetic ore. The Superior ores were part No. 2 and No. 2 specular ores and hematites, carrying at least an average of 6 per cent. silica. A noticeable feature in the work was that up to the time 14,054 tons were made the average fuel consumption was 2150 pounds to the ton. Some magnetic ore was then used, and the fuel went up to 2205 pounds for the whole amount of iron made. In these figures the raw coal is reduced to assumed coke equivalents, which prevents the using of these data for direct comparison with other blast-furnace results, the

employment of mixed fuels generally introducing complication into such calculations. The use of coke in connection with anthracite coal has been, it is believed, rendered necessary rather by the circumstance that the machinery of older plants was insufficient to meet the requirements of modern practice than on account of any inherent inferiority of anthracite as a blast-furnace fuel. If, as seems to be demonstrated, fuels rank in value in proportion to their surface exposure, charcoal is superior to coke, and coke excels anthracite, as a blast-furnace fuel; but, as higher pressure of blast increases the value of coke as a fuel, so a further intensity augments the results with anthracite. It has been the general custom to charge anthracite in large lumps, thereby offering a minimum of surface exposure for a single weight, but that practice has lately given way to the use of what is in the trade known as "steamboat" size, with improved result. A still further reduction in size will, it is believed, be advantageous by offering greater surface exposure, but at the expense of increased blast pressure; and the suggestion is offered that in a plant specially equipped to use anthracite coal in small pieces results may be obtained which will demonstrate its real



Fig. 1.



Fig. 2.

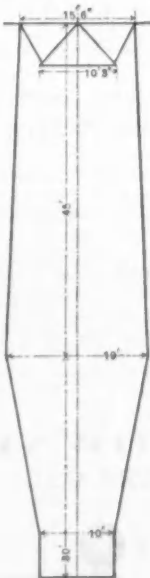


Fig. 3.

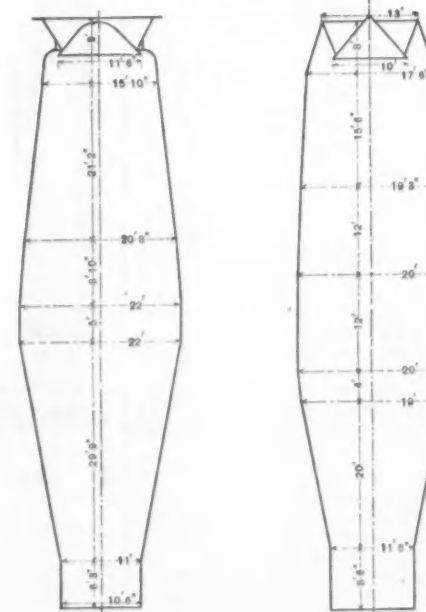


Fig. 4.

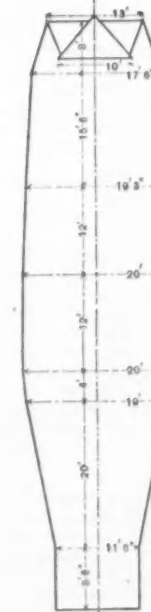


Fig. 5.

### BLAST FURNACE SECTIONS.

value as a fuel for blast furnaces. Without going into heat calculations, it seems safe to assert that if 900° temperature of blast are better than 600°, then 1200° should be preferred to 900°, and 1500° to 1200°; but it is equally safe to assert that the large economies promised by the application of what may be termed "superheated blast" have not been realized; and records may be noted which, although accomplished with temperatures not exceeding 1000° F., are unequalled by better-equipped plants using equally good stock.

Results obtained at various blast furnaces are presented below for comparison with those of the Warwick Furnace and with others which have or may be given in the discussion.

Furnace E of the Edgar Thomson Steel Works (20 x 80 feet) made, from June 27, 1882, to March 13, 1884, a product of 105,741 gross tons of Bessemer iron on a consumption of 2822 pounds of coke per ton of iron. See Fig. 5. Furnace D, with the same lines, made from April 18, 1882, to October 30, 1883, a product of 90,317 gross tons of Bessemer iron on a consumption of 2620 pounds of coke per ton of iron. Furnace D, as blown in September, 1885 (22 x 80 feet), see Fig. 4, is making at present 210 gross tons of Bessemer iron per day on 2050 pounds of fuel per ton of iron, this being the record for seven weeks. The best week's work averaged 218 gross tons daily on 1993 pounds of coke. The yield of ore in the furnace is 60 per cent.; the temperature of blast, 1100° F. For this data I am indebted to Mr. James Gayley, superintendent.

The record of a short blast (August 10th to December 1st, 1885,) of the Pine Lake Furnace, Michigan (bosh diameter 10 feet 4 inches, height 50 feet, blown with five tuyeres) is furnished by Mr. R. M. Chessie, as follows: The stock used was:

2,269,677 pounds hard ore. (Lake Superior)  
12,595,547 pounds soft ore. (Id.) district.  
Total, 15,105,224 pounds = 6,744.74 gross tons.  
486,120 pounds flux = 217.02 gross tons.  
348,792 bushels of charcoal (22 pounds each) charged by weight.

There were used in filling the furnace 2160 bushels of charcoal, which are included in the above. Made 3925½ tons of iron. Of this 26.4 per cent. was No. 1, 14 per cent. No. 2 and 19 per cent. No. 3, and the remainder higher numbers. The temperature of the blast ranged from 700° to 850°, the average being from 750° to 800°. The

actual time in blast was 99 days, and the results obtained were an average product of 39.65 tons of pig iron per day from ores yielding 58.10 per cent. of iron and requiring 3¼ per cent. of flux. The fuel consumption for the entire blast was 88.86 bushels = 1954.92 pounds, or, deducting for filling of furnace for blowing in, 88.3 bushels = 1942.6 pounds. Mr. Lee Burt writes that the Vulcan Furnace, Michigan (10 feet 6 inches diameter of bosh by 53 feet in height), for seven months, September, 1885, to April, 1886, averaged 51.1 tons of iron per day from ores yielding 60 per cent. iron, the consumption of fuel per ton of iron ranging between 1900 and 2000 pounds of charcoal. Seven tuyeres each of 3¼ inches diameter blow into a hearth 7 feet 2 inches in diameter, 4 feet above the floor.

Mr. John Hartman, in a published record of a selected week's operation of the Franklin Furnace, New York, furnishes the following data: Diameter of hearth, 9 feet; diameter of bosh, 14 feet; height, 70 feet; diameter at stock line, 11 feet; diameter of bell, 6 feet 6 inches.

Fuel per ton of pig iron (68½ per cent. coke, 63¼ per cent. anthracite coal), pounds..... 2,538  
Ore per ton of pig iron, pounds..... 5,691  
Limestone per ton of pig iron, pounds..... 1,420  
Cubic feet of air per minute..... 13,514  
Equivalent to 2 cubic feet per minute for each cubic foot of furnace capacity.  
Temperature of blast..... 1,100° F.  
Cinder made per ton of pig iron, pounds..... 2,474  
Contents of furnace, cubic feet..... 6,731  
Grade of iron: 342 tons No. 1, 260 tons No. 2, 12 tons No. 3.

The ore, a fossiliferous hematite composed principally of fine grains or shots, is of the following composition:

Iron.....	44.00	Magnesia.....	3.30
Silica.....	12.20	Carbonic acid.....	6.30
Alumina.....	5.04	Water.....	4.10
Lime.....	6.30	Oxygen.....	18.86

### Analysis of the Cinder Shows

Silica.....	35.98	Magnesia.....	6.38
Alumina.....	11.80	Sulphur.....	1.12
Lime.....	43.67	Oxide of iron.....	1.02

Mr. John J. Fronheiser, of the Cambria Iron Co., under date of April 7, writes: "We consider our No. 6 furnace of the best size and shape for the ores we work. It is 75 feet in height, 19 feet bosh, and is blown through six tuyeres 6 inches wide at the nose (see Fig. 3). This furnace has now

### MANUFACTURING.

#### Iron and Steel.

A company with a capital stock of \$500,000, to be known as the Pittsburgh Iron Car Works, is being formed in Pittsburgh. Prospects have been sent out to business men, and it is claimed nearly half of the capital stock has been subscribed. The company will manufacture iron cars such as are now used at the Lucy Furnace, and forge and structural work in general. Jos. H. Gartside, of Pittsburgh, is at the head of the movement. He is confident of success and expects to have a new mill in operation inside of a year.

Of the iron manufacturers not represented at the recent scale conference the following have accepted the scale: The North Chicago Rolling Mill Co., at Bayview; the Sharon Iron Co., at Sharon; P. L. Kimberly & Co., at Sharon; the Girard Iron Co., at Girard, Ohio; the Youngstown Rolling Mill Co., Youngstown, Ohio; Brown, Bonnell & Co., and the Enterprise Rolling Mill Co., at Youngstown, Ohio.

The Whitaker Sheet Iron Mill, at Wheeling, has signed the Amalgamated Association scale. It involves an increase of 50 cents per ton for hot cinder fix and pay for changing rolls—two new features at this mill.

A 10 per cent. reduction in the wages of the makers, feeders, cutters and packers in the spike department of Dilworth, Porter & Co.'s mill, at Pittsburgh, has been made. The workers have appointed a committee to confer with the firm and demand a repeal of the order.

The nail factory of Jones & Laughlins, at Pittsburgh, was put in operation on the 20th ult., after being idle exactly 13 months. Preparations to start up the other factories there are being made. Shoenberger & Co. are putting a new set of boilers in their nail department. Chess, Cook & Co. will start their new steel works at Rankin Station, near Pittsburgh, which has been completed several weeks, in readiness to supply nail plates to their factory on the Southside, which is being put in repair.

The Harrisburgh (Pa.) car shops are now running full time with a large force of men. Six cars are finished per day.

The property of the Lehigh Car Mfg. Co., at Stanton, Pa., will be sold at sheriff's sale on the 24th inst.

It is said that a company of Hubbard capitalists propose to erect a tin-plate mill at Hubbard, Ohio. A quantity of black plates will be imported from Swansea and if they can be laid down at paying prices the mill will be erected.

At the steel works of Hussey, Howe & Co., Pittsburgh, the foundation for a large plate shear is being laid. The shear is being made by Morgan & Co., Alliance, Ohio, and will have a capacity to shear plates 9 feet wide.

On Monday last the rolling mill of the Reading Iron Works was closed probably for about six weeks, during which a new engine of increased horse-power will be put in. Nearly 60,000 bricks will be used to construct the foundation. Other improvements will also be made during the stoppage.

Smith Bros. & Co., of the La Belle Steel Works, Allegheny City, will start up their new furnace about August 1 next.

The Hartman Steel Co., Limited, of Beaver Falls Pa., have commenced the erection of a two-story building, 40 x 150 feet, for the manufacture of their patent wire mats. This was necessitated by the increasing demand for these goods.

The Calumet Iron and Steel Co. started up their merchant bar mill at Cummings, Ill., on the 20th ult., and expect to begin running the guide mill within the next 10 days, also their steel department for the manufacture of steel castings and merchant steel. The nail factory has been in operation for the last three weeks, and is running 80 machines. The company are gradually increasing their working force, and at present are turning out 700 kegs per day of steel cut nails of all sizes. The non-union workmen give satisfaction, and the boycott placed upon the nails made by the Western Nail Association mills, which are employing non-union labor, has no perceptible effect upon the sale and use of the company's product.—Chicago Industrial World.

The Cambria Iron Co., Johnstown, have received an order from the Atchison, Topeka and Santa Fé Railroad for 10,000 tons of steel rails.

Mr. George H. Everson, manager of the Scottsdale (Pa.) rolling mill, has notified the puddlers in his employ that their wages will be 12½ per cent. more than they have been receiving.

Under date of July 1 the Apollo Iron and Steel Co. announce that on the 21st ult. they purchased the rolling mills and galvanizing works of the Volta Iron Co., Limited, which properties now constitute the sheet department of their works.

The works of the Allison Mfg. Co., at Philadelphia, have been closed, and operations will be entirely suspended for two weeks. The company give as a reason for closing their desire to take an inventory of stock.

The Mingo Nail Works, Steubenville, Ohio, which have been idle for several days, occasioned by a broken roll, resumed work in part. The entire factory will be in operation by the 8th inst.

Messrs. Park Bros. & Co., of Pittsburgh, are going to build a blast furnace for the manufacture of special low-phosphorus pig on Herr's Island, near Pittsburgh.

Preparations are being made to remove the Pittsburgh office of Oliver Bros. & Phillips' mills from Water street to the new warehouse and office building nearly completed. The new building is on Bingham street, between Thirteenth and Fourteenth streets, on the Southside, adjoining the steel mill, and will cost \$30,000. The interior is being fitted up in a very complete

Doleful accounts are coming from Texas respecting the wool crop, the sheep having perished by thousands from drought.



and expensive manner. A switch from the newly-completed Pittsburgh and Whitehall Railroad runs into the building, giving excellent shipping facilities. The building is 100 x 200 feet in size and is fire-proof.

#### Machinery.

The Bignall & Keeler Mfg. Co., of St. Louis, Mo., recently shipped one of their new nipple machines to Kansas City; one No. 3 Peerless pipe cutting and threading machine to Pittsburgh, and one of their new shingle machines to Louisiana. They are now busy on orders for their various special machines.

About 60 of the 200 employees of the Westinghouse Machine Co., of Pittsburgh, have been suspended for an indefinite length of time. The suspension is due to having a very large amount of stock on hand at present, and the men will probably be out of work for several months.

The Lewiston (Me.) Machine Co. have just contracted to build another hundred worsted looms for the Manchester mills. This makes the fourth hundred of these looms that the Lewiston Machine Co. have made for these mills.

The Union Switch and Signal Co., of Pittsburgh, have concluded an arrangement with the Pittsburgh, Virginia and Charleston Railroad authorities to put in their switching and signaling system on the Southside. It has also contracted with the Rapid Transit Co., of New York, to put up their signals and switches in Harlem. At a meeting of the company held last week \$500,000 of the present capital was made preferred stock.

The Electrical Supply Co., of Ansonia, Conn., have added several braid and cabling machines to their equipment.

The Otis Iron and Steel Co., of Cleveland, recently finished the top section of the anvil block for a 15-ton hammer now being built by the Morgan Engineering Co., of Alliance, for the Crescent Steel Works, of Pittsburgh. The section weighs 55,170 pounds. This is said to be heavier by more than 50 per cent. than any other steel casting ever made in this country.

The Wright & Adams Co., Quincy, Ill., have just completed and have ready for shipment a hoisting plant for the Paymaster Mining Co., of Colorado, consisting of a 30-horse-power vertical boiler, a winding engine of 500 feet winding capacity, a sinking pump, ore buckets, &c., all complete, ready for work.

The Smith, Beggs & Ranken Machine Co., St. Louis, Mo., have about 15 steam engines in various stages of work, with diameter of cylinders running from 12 to 26 inches. Included in these are the three large engines for the Tudor Iron Works, and two for saw-mills at Weatherford, Tex. In the fly-wheel line they have some very heavy work, principally for the new engines ordered from them. The heaviest wheel in the shop is the one in work for the blooming department of the Western Steel Co.; this will be 26 feet 8 inches in diameter and composed of 10 sections, each weighing 10,000 pounds. When finished, with center added, the total weight will probably exceed 100,000 pounds.

Forbes & Curtis, Bridgeport, Conn., report an active trade. They are running to their utmost capacity, and are behind their orders. They are negotiating for a large shop, which they propose to erect to a model plan, and will, by the change, very greatly increase their capacity. They are just completing a new double-header milling machine, the invention of Mr. Forbes.

Stokes & Parish, 3001 Chestnut street, Philadelphia, manufacturers of elevators, report a very brisk business. The orders received by them continue to be very gratifying, and they inform us that the outlook is excellent. Prominent among the orders now awaiting execution might be mentioned the following in Philadelphia: In the new building on Market street, above Thirteenth street, to be occupied by Henry Gibson, will be erected one passenger and one freight elevator; in the Philadelphia and Reading Railroad office, on Fourth street, below Walnut street, will be placed one passenger elevator; B. F. Dewees, on Chestnut, below Twelfth, one passenger elevator; Elleston P. Morris, on Arch street, above Seventh, will have two passenger elevators erected; Hood, Bonbright & Co., have given orders to have seven elevators built, both passenger and freight, for their new building at the corner of Eleventh and Market streets. In addition to the above the Crane Iron Co., at Catasauqua, Pa., will have erected one steam hoist for furnace, and the Cambria Iron Co., Johnstown, Pa., will also have one steam hoist for furnace built; Ogden Mills, of New York City, will have erected in his residence one passenger elevator, and the Young Women's Christian Association, of the same city, have also ordered one passenger elevator. The distinct feature claimed for their elevators by the manufacturers is that they are specially adapted where rapid transit is required. Although not quite as smooth running as the hydraulic, they fully make up this deficiency in the cost, as they are claimed to be considerably cheaper than the hydraulic elevator.

The Atlas Engine Works, of Indianapolis, Ind., are doing a very flourishing business. They have ceased making portable engines, and are turning out only stationary engines, and have just secured the contract to furnish power to the Minneapolis Exposition. The works have orders ahead for their sand molding machine to keep them busy for six months' steady work.

Messrs. Hassellman & Sons, proprietors of the old Eagle Works, Indianapolis, Ind., are running double turn, and cannot ship their threshers and traction engines fast enough to fill orders. The large grain crop has caused an unlooked-for demand for improved machines.

#### Miscellaneous.

The various glass houses in Pittsburgh closed down on the evening of the 3d inst. for the summer. For from 30 to 60 days

about 8000 men will be idle. Twenty-seven window-glass factories with 270 pots will be shut down at least to the 1st of September. Sixteen tableware manufacturers will close up their 379 pots for 30 days, and 16 bottle manufacturers will be idle for the same length of time.

The Atlas Bronze and Tuxey Co., Limited, have commenced operations on Smallman, between Twenty-eighth and Twenty-ninth streets, Pittsburgh. They will manufacture bronze tuyeres, coolers, bosh plates, engine and rolling-mill brasses. A new building has been erected and work commenced. A. C. Milligan is chairman; J. E. Blackmore, secretary and treasurer, and W. S. Bostwick, general manager.

Indianapolis, Ind., has suffered very much on account of the general labor troubles in the way of large buildings, particularly iron structural work. The Haugh, Ketchum & Co. Iron Works say they have not near the volume of business that they get usually; that almost no new contracts are offering except in the county, where they are filling several contracts for wrought work, in which branch they are fairly busy. One instance of the prosperity of the city is the remarkable growth of the suburbs. Haughville, which a few years ago was a stretch of fields and commons, with the buildings of a few manufacturers, now is laid off in regular streets, with comfortable houses, principally belonging to the laboring classes. The I. B. and W. and the I. D. and S. Railroad shops and yards are located here; also the Haugh, Ketchum & Co. Iron Works and the Indianapolis Malleable Iron Works. This latter company have lately commenced, in addition to their malleable department, a foundry for gray-iron castings, shelf hardware, &c. Belmont is another beautiful suburb, lower down the river. It is well laid out with long avenues shaded by maples. In Belmont are situated the Indianapolis Car and Mfg. Co. and the Nordyke & Mannon Co. The latter firm report business very good, with prices holding good on all of their work, which is of the highest grade of machinery and millwork. Belmont is well lighted by electric lights elevated 100 feet on wrought-iron skeleton towers.

Samuel C. Tatum & Co., Cincinnati, Ohio, are just finishing for a special order a copying press which is believed to be the largest yet made. It will take in a book 24 inches wide and 32 inches long, and weighs little less than 1/2 ton. Notwithstanding its great size, the design of the press has been carried out upon graceful lines, and at the same time attention has been given to placing the material where it will be most needed.

Recently there were offered for sale by auction, in London, 10 extensive Scotch estates, comprising about 74,000 acres, including woodland, deer parks and improved property. Every one of these estates was bought in by the auctioneer for the owners, the prices offered being far below the lowest valuation. One piece of property of 8000 acres, with a fine mansion, giving an income from rentals of more than \$25,000 a year, was met by an offer which at 3 per cent. would only have returned the amount of the rentals.

The agreement entered into a few months ago by which some of the trunk lines were to bear the responsibility of losses on freight destroyed or detained on any of the fast freight lines, controlled by them seems to have been executed by the carriers in good faith. Inquiry develops the fact that the New York Central and other roads now meet the losses occasioned by these subordinate companies. This state of affairs is considered eminently satisfactory.

President Furrow, of the New York Fire Department, recently returned from London, is strongly impressed with the necessity of making our building laws conform to those of London and Paris with respect to the fire-proof character of buildings, thus rendering fire a much less dangerous element. He also advocates the introduction of a portable electric light, which would prove useful in contending with fires in subcellars.

The Manufacturers' Record notices the continuance of organized movements throughout the South for the development of manufacturing and other forms of industrial activity. Aside from smaller undertakings, no less than 70 enterprises of considerable importance came under notice in a single fortnight. These latter include numerous mills for textiles, lumber, grain, &c.; also factories for the production of furniture, brooms, doors and a variety of other articles.

One of the phenomenal features in the development of the southern counties of California is the productiveness of the Colorado Desert when water can be secured. Artesian wells have been sunk, and by irrigation it is found that grapes and many other kinds of fruit can be produced from a month to six weeks earlier than elsewhere in the State.

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### Browne's Exterminator

For exterminating all kinds of burrowing animals, such as

GOPHERS, PRAIRIE DOGS, GROUND SQUIRRELS, BADGERS, ETC., ETC.

This is an apparatus for burning straw and sulphur and forcing the smoke and gas down their holes, which kills them.

Over 2000 Sold in the Last 60 Days.

Being unable to supply the fast increasing demands, I am desirous of allowing responsible parties to manufacture on a royalty. They can be made in any tinshop, and cost about 50 cents. Will send a sample Exterminator to dealers for 75 cents. Weight about 5 lbs. Circular free. Write for particulars and secure territory. Address

F. E. BROWNE.  
LOS ANGELES, CAL.

CHICAGO SINGLE-ACTING SPRING BUTTS.	CHICAGO SPRING BUTT CO.	BRONZE NICKEL PLATED PER PAIR.	BRONZE NICKEL PLATED PER PAIR.
DOORS.	NICKEL OR BRONZE PLATED OR REAL BRONZE AND BRASS.	NICKEL OR BRONZE PLATED PER PAIR.	NICKEL OR BRONZE PLATED PER PAIR.
14 to 16 in.	JAPANESE.	\$1.25	\$2.00
16 to 18 in.	JAPANESE.	\$1.50	\$2.50
18 to 20 in.	JAPANESE.	\$2.00	\$3.00
20 to 22 in.	JAPANESE.	\$2.50	\$3.50
22 to 24 in.	JAPANESE.	\$3.00	\$4.00
24 to 26 in.	JAPANESE.	\$3.50	\$4.50
26 to 28 in.	JAPANESE.	\$4.00	\$5.00
28 to 30 in.	JAPANESE.	\$4.50	\$5.50
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94 to 96 in.	JAPANESE.	\$21.00	\$22.00
96 to 98 in.	JAPANESE.	\$21.50	\$22.50
98 to 100 in.	JAPANESE.	\$22.00	\$23.00

### "FLORENCE" LAMP STOVE.

Well Advertised, Sells Quick and Pleases Everybody.

Why not try them? The ALFORD & BERKELE CO. Selling Agents,

77 Chambers St., New York.

The Conroy Patent Fastener, For Ice Boxes, Refrigerators, &c., Not only easily shuts the tightest door, but forces it open when the handle is raised. An immediate success wherever introduced. Simple, effective and ornamental. Over 5000 Now in Use. P. J. CONROY, 1005 & 1007 Catharine St., Phila.



Wrought Iron. Anti-Friction.

IT EXCELS ALL OTHERS

Security of Door. Strength of Material. Ease of Motion. Simplicity of Application.

THIS HANGER

Requires no Oil. Has no Flanged Wheels. Packs snugly for shipment.

SELLS BEST.

VICTOR MFG. CO., Newburyport, Mass.

## LITTLE GIANT TOOL GRINDER



The Little Giant Tool Grinder is designed to sharpen machinists' tools of all kinds. Running a Corundum Wheel in water, the grade of wheel varying to suit the kind of work to be done, all danger of drawing the temper from hardened tools is avoided. The particles of Corundum composing the wheel are hard and sharp, and will cut many times faster than the ordinary grindstone, and at the same time be more exact, as the operator stands near the wheel. It takes up less room; it is cleaner; it makes no offensive smell, and is the cheapest general tool grinder ever produced. This machine can be set up anywhere, taking up bench-room of only 22 x 12 inches, thus allowing several to be located on a floor in large shops, having them conveniently situated for the men, so as to avoid walking long distances to sharpen a tool. The saving of time in this way alone will soon pay for the small cost of the grinder. The wheel being covered with a hood, except where the grinding is done, no water flies off. We have adopted for use in this grinder a special Corundum Wheel, which, by reason of its porous nature, is constantly moist, and in consequence there is no danger of drawing the temper from the tool.

As the Corundum Wheel is to do the work of a grindstone, it should not be run as fast in water for grinding tools as is recommended for a wheel running dry for general purposes. Speed of wheel, 700 to 900 revolutions per minute. Weight, 60 pounds. Runs wheels 10 x 1 inches and 10 x 2 inches.

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THE NEW YORK SUPPLY CO., LIMITED,

RAILWAY, MACHINISTS', ENGINEERS' AND MILL SUPPLIES,

No. 50 & 52 JOHN ST., NEW YORK.

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## Gooch Peerless and Giant Freezers.



OUR FREEZERS STAND UNRIVALLED. The best Goods ever made. SUPERIOR IN EVERY PARTICULAR. NO OTHER FREEZERS EVER MADE SUCH A SALE.



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Nos. 28, 30, 32, 34, 36 and 38 E. NINTH ST.,

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## THE FAIRY TRICYCLE.



Durable and cheap; runs the easiest; no chains or gears to catch or tear clothing. A good hill climber, and can be ridden where other machines fail. For adults, invalids and children. Agents wanted. THE FAY MFG. CO., Elyria, Ohio.

J. H. Sternbergh, Reading, Pa., MANUFACTURER OF

REFINED BAR IRON.

Also as a Specialty Bolts, Nuts, Washers, Rivets, LAG SCREWS, TURNBUCKLES, Rods and Forgings for Bridges and Buildings, &c., &c., &c.

JOHN N. POTT, MINING ENGINEER,

Allentown, Pa.

SPECIALTY.

Exploration and Development of Coal Lands.



# GALLOWAY BOILER

IMPROVED UNDER PATENTS OF 1875 AND 1876.

**Safety Economy in Fuel, Low Cost of Maintenance, Dry Steam without Superheating, Large Reserve Power,**

ARE THE ADVANTAGES OFFERED BY THIS BOILER IN A PRE-EMINENT DEGREE.

**3000 Horse-Power in Progress and for Immediate Delivery. Correspondence Solicited.**

**EDGE MOOR IRON COMPANY,**

**SOLE LICENSEE AND MANUFACTURER FOR THE UNITED STATES,**

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## PARAGON ANTI-FRICTION DOOR HANGER.



**SPECIFIED BY ARCHITECTS AND BUILDERS.**

We make the broad claim that the **PARAGON HANGER** is the **BEST** device for operating sliding doors ever shown to the Trade.

**BECAUSE**

It is the strongest and most durable, made in one solid piece from air-furnace refined malleable iron (no bolts or rivets to wear and work loose), is the easiest operated, impossible to derail and never requires lubricating, and is by far the handsomest and finest finished Hanger in the market. Using the only polished steel Tee-Rail ever invented. Are made in three sizes (4 to 24 ft. run) for Barn and Warehouse use. No. 4 Parlor Hanger, pat. fiber wheel, absolutely noiseless, cannot wear out. Nos. 5 and 5½ for elevator and small house doors, and No. 6 Car Door Hanger now adopted by the leading railways in the United States.

**The Dunham Mfg. Co.,**

SOLE MANUFACTURERS,  
**BOSTON, MASS.**

GEN'L AG'TS., **LOUDERBACK, GILBERT & CO., 33 Chambers St., New York.**  
**NEWLIN, KNIGHT & CO., Philadelphia, Pa.**  
**EMERY, WATERHOUSE & CO., Portland, Me.**

## Hardware Novelties.

### New Harvester Knife.

The illustration given below represents a new form of knife or cutter for mowing and reaping machines which has recently been patented by W. S. Taylor, of Huntington, Pa., and which will be manufactured by the Hatch Bros. Co., Bridgeport, Conn. This article is designated as the Taylor Reciprocating Harvester Knife, its special peculiarity being its shape, which is represented in the illustration. It is claimed that the new blade is much superior in cutting efficiency to the old triangular-shaped section knife, the point being made that it cuts much faster, because, while occupying no more space on the cutter-bar, it presents a largely increased cutting surface, owing to the sickle shape given to the sides. It is also

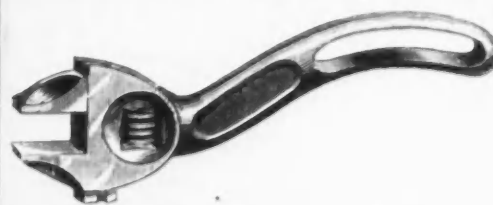


Taylor Reciprocating Harvester Knife.

claimed that it requires less power than the old knife, and is not liable to clog or choke in any kind of grain or grass, and that it can be easily sharpened without being removed from the cutter-bar, and is adapted to the different machines in use. It is put on the market by the manufacturers as the result of continued and successful experiments, and with the expectation that it will meet with general favor. A circular giving full description of this article is issued.

### The Cortland Adjustable "S" Wrench.

The accompanying illustration represents this article as manufactured by the Cortland Wrench Co., Cortland, N. Y., for whom the Ross & Fuller Association, 33 Chambers street, New York, are sole agents. Its form and general features are indicated in the cut. It will be perceived that it is operated by a spiral burr which moves the sliding jaw in the manner indicated. This wrench is especially designed for machinists' use, and its utility in reaching into machinery will be recognized, as well as the value of its adjustable feature, which gives it a wide range. Hence the manufacturers make the point that, while it will do all the ordinary screw wrench performs, and more, it is



The Cortland Adjustable "S" Wrench.

applicable where an ordinary wrench cannot reach or be applied. It is made 3, 10 and 14 inches, and is also supplied with a pipe attachment.

### Samson Door Hanger.

The accompanying illustration represents this article as made by the Medina Mfg. Co., Medina, N. Y. The hanger strap is described as made of heavy steel, corrugated, and it loops over the head containing the wheel, fitting rigidly in the same and clamping the head, which is of one solid piece, with a view to making it impossible for it to spread, and thus keeping the wheel from being displaced. The axle-pin is made of drawn steel shafting, and is described as perfectly round, and the wheels are drilled



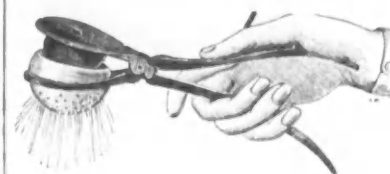
Samson Door Hanger.

and the pin driven in. Special attention is also called to the fact that the way or tread for this axle is broad, so that the axle has plenty of surface to run on, and cannot become lodged and cut a bearing place, as others are liable to do. In order to overcome the liability of hangers to spring open and allow the wheel to fall out or prevent it from running properly, the head of this hanger is made of cast iron, and then, to make sure of its having all requisite strength, the top is encircled with a steel strap, as above alluded to, the stiffness of which is greatly increased by the corruga-

tion. The hanger as thus constructed is the result of much experiment, and is put on the market with the claim that it is exceptionally strong, easy running and durable.

### Atomizer and Sprinkler.

The accompanying illustration represents the construction and use of Goldmat's Patent Atomizer and Sprinkler, which is be-



Atomizer and Sprinkler.

ing put on the market by the Alford & Berkeley Co., 77 Chambers street, New York. It consists of an iron frame or handle of the form represented, one arm of which contains a rubber ball, while another, under the pressure applied by the handles, presses upon upon the ball and ejects the water or other liquid contained in it. This rubber ball has fine perforations on one side, as indicated, through which the spray is forced, and the other side has a hole through which, when the ball is dipped in water, the water enters, this opening being closed by the plunger when pressure is applied. The ball is so formed as to fit snugly and firmly into its receptacle. Many uses are designated for this article, such as sprinkling flowers, house plants, clothes, &c., and its simplicity, durability and inexpensiveness are specially alluded to. When the rubber ball is worn out another can be obtained at slight expense.

### Bell's Latest Invention.

Prof. Alexander Graham Bell and his cousin, Dr. Chichester Bell, of Washington, have recently made a very remarkable discovery, which they think is quite as important as the transmission of the tones of the human voice through the telephone. They have discovered that a falling jet of water or a flame of gas burning in a room reproduces every word spoken and every sound uttered within a given distance. When two people join in conversation in a room in the evening the gas which burns above their heads repeats every word they say, and sounds uttered in the vicinity of flowing water produced vibrations. It is well enough understood that whatever can repeat the waves of air produced by any loud sound will repeat the sound itself. It is the principle of the telephone. But in the telephone the original impulses are repeated instantly, and die away forever. In this new apparatus, assuming that it really does all that is described, the waves are not reproduced in that form, but their effect on a jet

of water, long known to be sensitive to such impulses, is caught by instantaneous photography and permanently recorded on a glass plate in the form of minute irregularities of surface. By suitable apparatus these elevations and depressions, which correspond to pulsations of air, are retranslated into air waves, and the voice is heard again. The water, or liquid of whatever kind it may be, is colored with bichromate of potash. If it

were perfectly clear it would not answer, because the light used in photographing would pass through without resistance, and no record would be made on the tablet. The water is colored for photographing, and the jet is made to fall obliquely on a glass plate. The water spreads itself out on the glass plate and runs off. It is the water so spread out that is to be photographed as it passes. Words spoken cause the jet of water to vibrate; the vibrations in the jet cause corresponding vibrations in the film of water as it breaks and spreads on the glass plate and runs off. A ray of light is passed through that film and through the glass plate to a sensitive tablet behind. The vibrations in the liquid film are reflected in the variations of intensity of the impression made on the photographic tablet. Speaking continues, the jet keeps running, the film keeps passing over the plate, the recording tablet keeps moving as the film keeps moving, and the light, passing through this film to the tablet, makes a record of the speech far more accurate than any verbatim report.

A member of the New York Yacht Club, who for the present is not publicly known, has closed a contract with Harlan & Hollingsworth, the builders of the iron sloop yacht Priscilla, to build for him a steel schooner yacht. Two besides the Priscilla, the schooner Mischief and the cutter Vindex, are of iron. The advantages of using steel or iron instead of wood, beyond that of lightness in construction, are that such vessels do not become water-soaked; they may be built with fine lines; the weight may be placed deeper; the ballast is not required to be changed at frequent intervals; there is no such nuisance as bilge water, and the inside of the hold is cemented, so that it may be kept perfectly free from the acids and juices of woods.

The total assessed valuation of real and personal estate in New York City, as just reported by the Tax Commissioners, is very little less than \$1,421,000,000. That is nearly \$32,000,000 more than the remaining national debt of the United States. Of this vast sum only \$217,000,000 are assessed upon personal property. The increase of valuation over the list of 1885 is nearly \$50,000,000, of which more than \$35,000,000 are upon real estate, mainly in the upper wards. The First Ward is the only one in which there is a falling of from last year. About \$35,000,000 will be required for carrying on the City Government the current fiscal year.

The Senate agrees to appropriate \$1,000,000 for the deepening of New York harbor at Sandy Hook.

MANUFACTURERS OF AND DEALERS IN ALL KINDS OF  
**FOUNDRY FACINGS**  
**PLUMBAGO OR BLACK LEAD**  
For All Purposes.  
ALSO SHIPPERS OF THE CELEBRATED  
**CINCINNATI MOLDING SANDS**  
For Stove Plate, Heavy and Light Machinery, Agricultural and Brass Work.  
Agents for **MONK'S CELEBRATED MOLDERS' TOOLS.**  
Send for Illustrated Catalogue and Price List. No charge for Samples.



**EAGLE**  
THE LARGEST FACING MILLS IN THE WORLD.  
Capacity, 650 Barrels Per Day.  
**FOUNDRY SUPPLIES**  
**MILLS**  
**HEAVY MACHINERY**  
AND FINE  
**STOVE PLATE FACINGS**  
A Specialty.

**S. OBERMAYER FOUNDRY SUPPLY MFG. CO.,**  
**CINCINNATI, OHIO.**

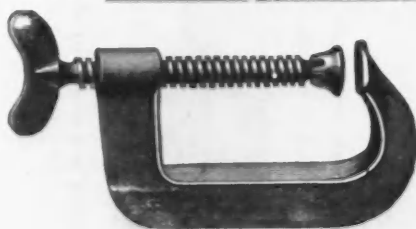
## Mount Carmel Ox Shoes,

**WITH STEEL TOE CALKS.**

The Best and Cheapest Shoes Made.

Warranted to Outwear Any Other Shoe.

Six Sizes Each. Blunt and Sharp Calks.



## Eagle Screw Clamps,

WITH

**BALL and SOCKET SWIVEL.**

Ten Sizes. To Open.

2, 2 1-2, 3, 4, 5, 6, 7, 8, 10, 12 Inches.

**Coach & Carriage Hardware & Fine Mountings**  
**Malleable Iron and Brass Castings.**

Correspondence solicited.

**WOODRUFF, MILLER & CO., Mfrs., Mount Carmel, Conn., U. S. A.**



**DYNAMITE**  
FOR ALL KINDS OF BLASTING  
**CAPS, FUSE**  
AND ALL  
**BLASTING SUPPLIES.**

Write for Illustrated Pamphlet. Mailed free Agents wanted.

**AETNA POWDER CO.,**

98 Lake St., Chicago.



The Original Inventors and Manufacturers of the

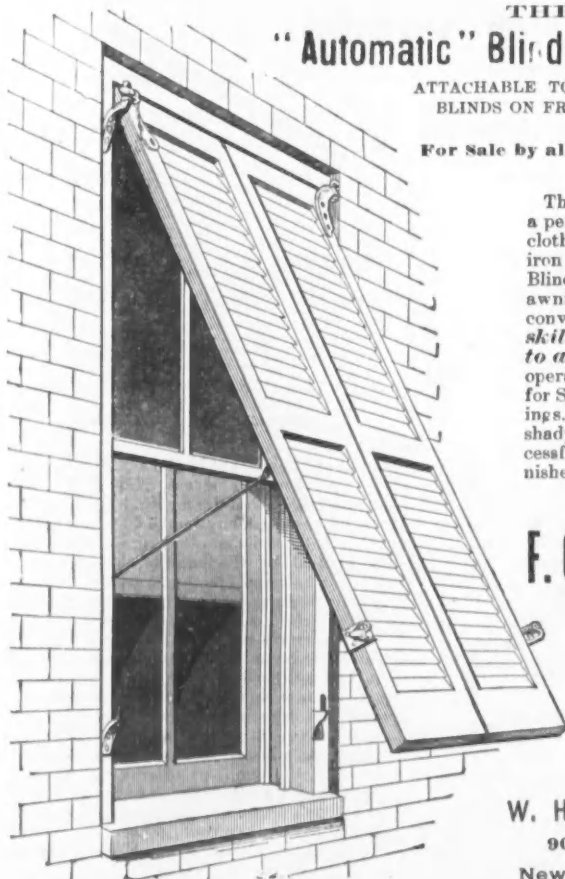
**"OSBORN"**

Bright Metal Cages, in Brass, Bronze and Silver Plate.

**NEW AND BEAUTIFUL DESIGNS JUST OUT.**

We also manufacture Brass and Bronze Show Stands for Fancy Goods. Catalogues Mailed Free.





### THE "Automatic" Blind Awning Fixture.

ATTACHABLE TO OLD AS WELL AS NEW BLINDS ON FRAME OR BRICK HOUSES.

For Sale by all the Hardware Trade.

The very best Blind Hinge and a perfect Awning Fixture. No cloth to tear and wear out. No iron frames to shake and rattle. Blinds instantly converted to awnings. Awnings instantly converted to blinds. *No skilled labor necessary to apply them.* A child can operate them. Indispensable for Summer Hotels and Dwellings. Rooms always cool and shady. Many thousands in successful operation. Models furnished to architects.

**F. O. NORTH & CO.**

SOLE MANUFACTURERS.  
**BOSTON, MASS.**

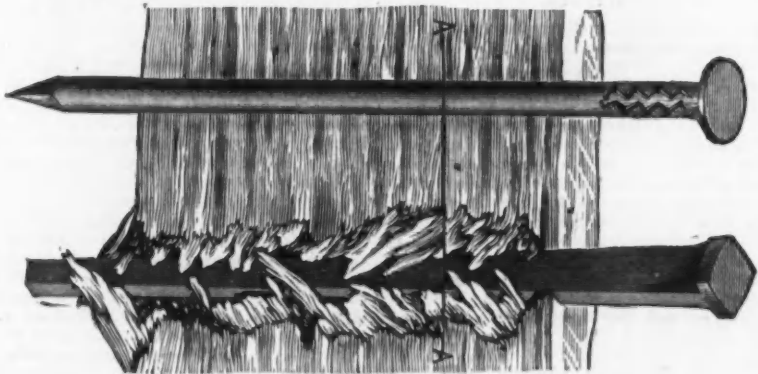
**W. H. JACOBUS & CO.,**  
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New York Warehouse.

**THE SALEM WIRE NAIL CO.,**

SALEM, OHIO,

—MANUFACTURERS OF—

**WIRE and WIRE NAILS.**



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**N. U. WALKER CLAY MFG. CO.,**  
Pittsburgh, Pa.



**CORTLAND ADJUSTABLE S WRENCHES.**  
The Best Machinist's Wrench in the World.

**The Ross & Fuller Association,**

33 Chambers Street,  
NEW YORK,

SOLE AGENTS.



### THE "Challenge" Fire Hose Carriage

Holds from 500 to 800 feet of 1 1/2-inch Hose; 44-inch Wheels; Patent Swing Tool Box; no weight on handles; nickel-plated trimmings; light and easily handled. Price, including 300 feet best quality 1 1/2-inch Linen Hose, coupled, \$100.

**EDWD. H. JACOBS & CO., Mfrs., Danialsonville, Conn.**



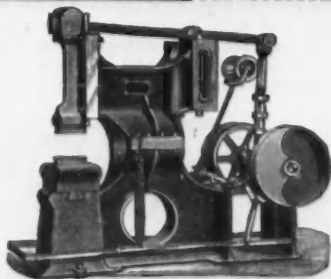
### THE PERFECT Towel Holder

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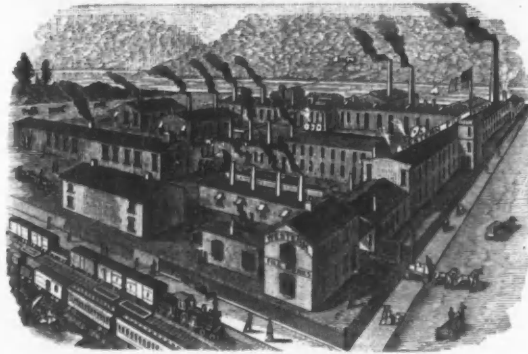
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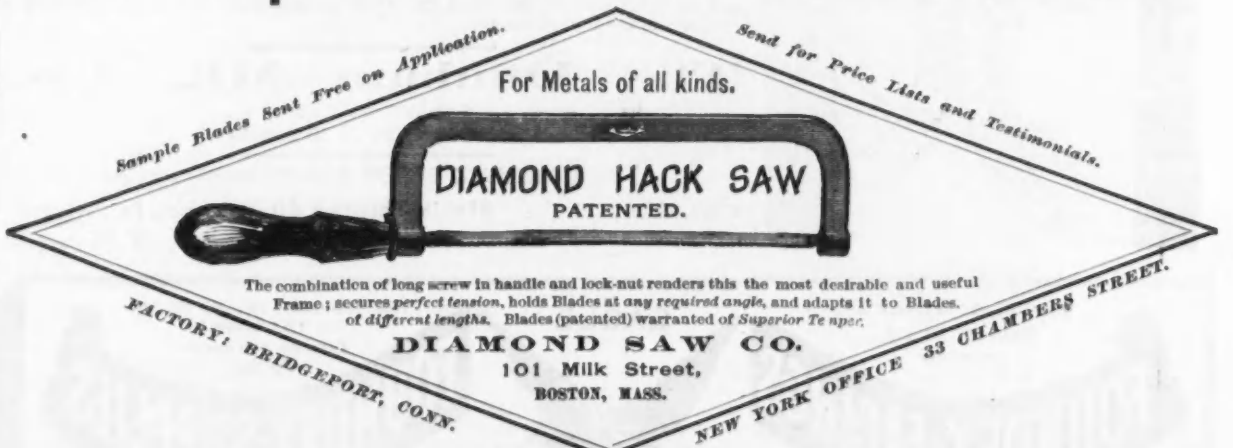
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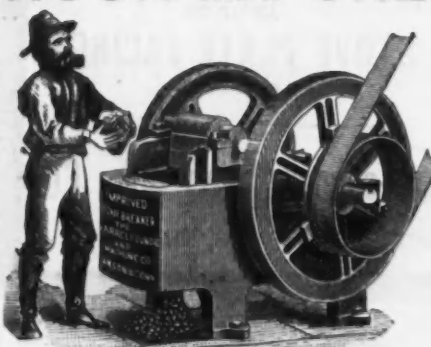
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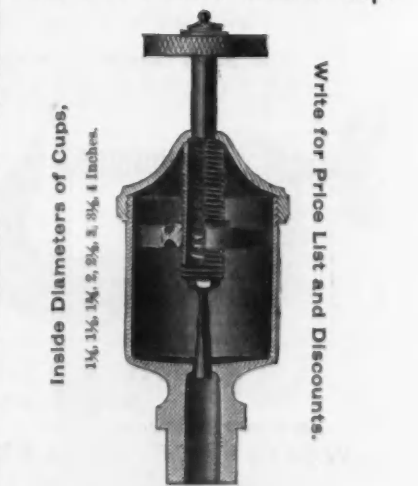
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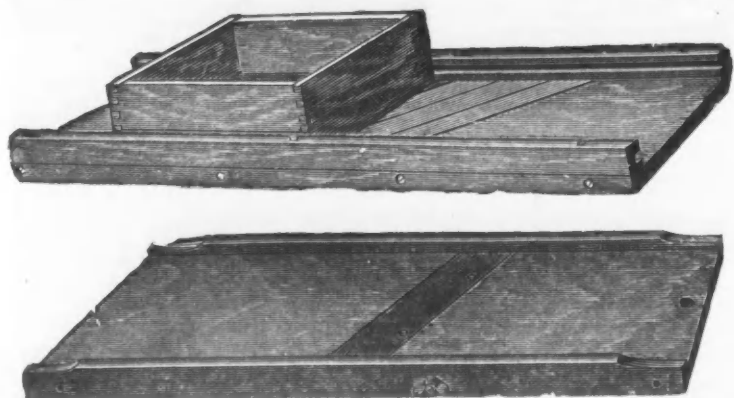


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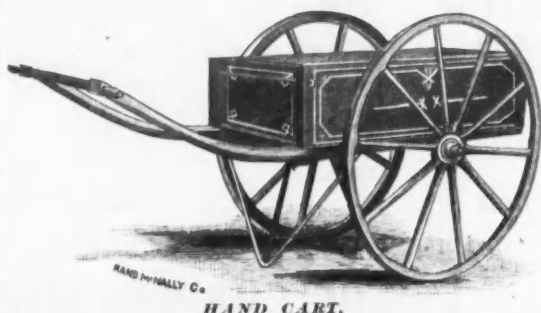
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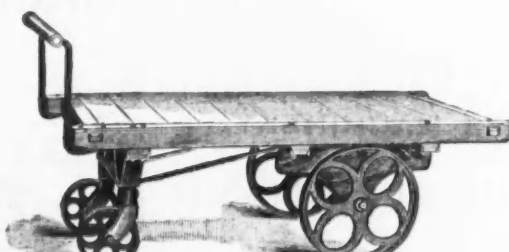
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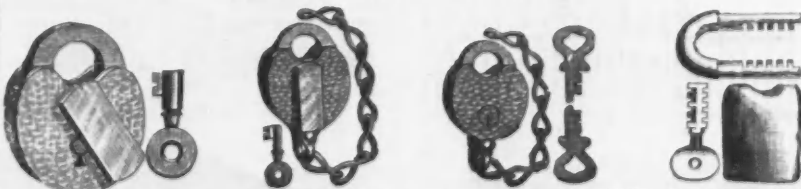
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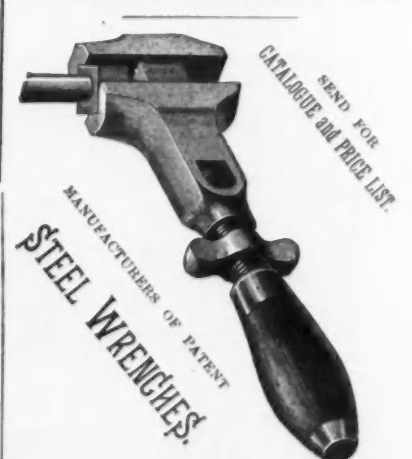


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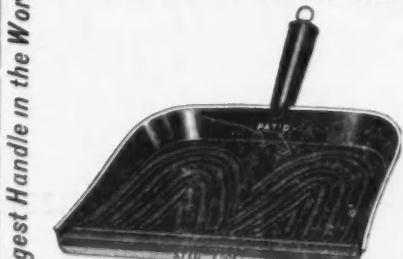
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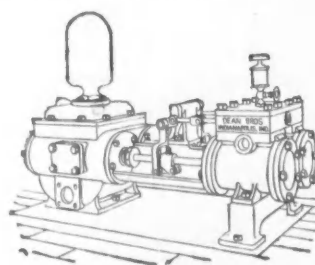
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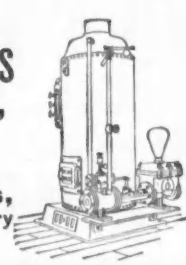


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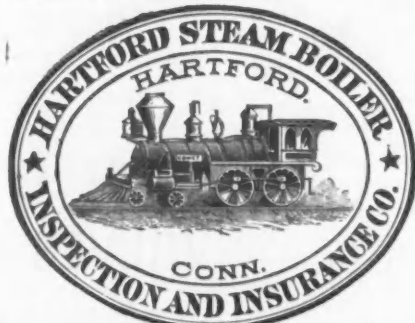


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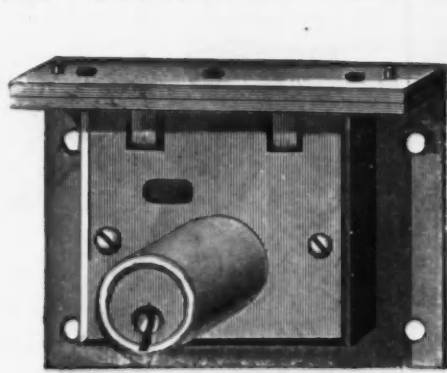
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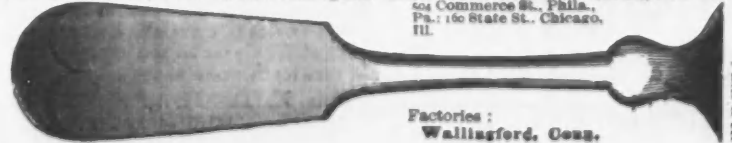
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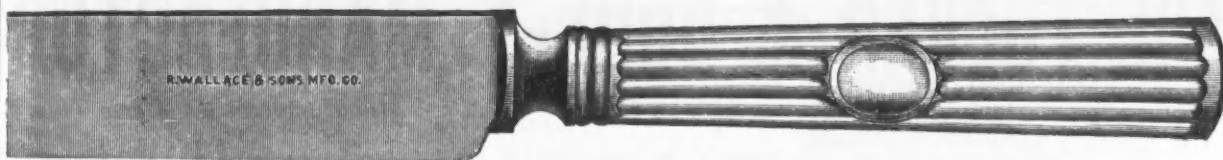
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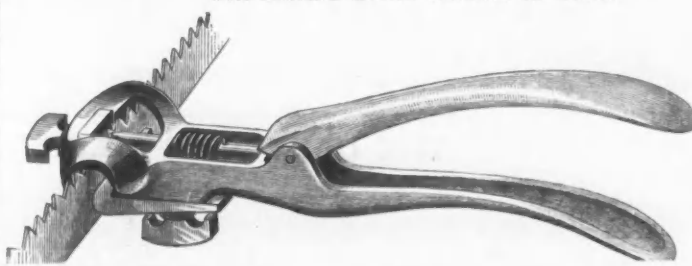
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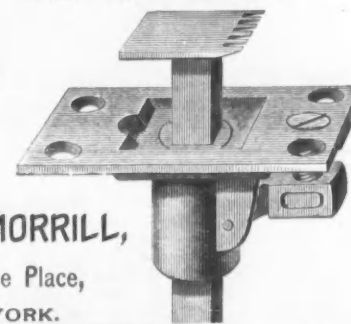
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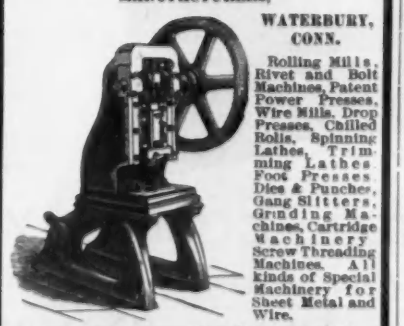


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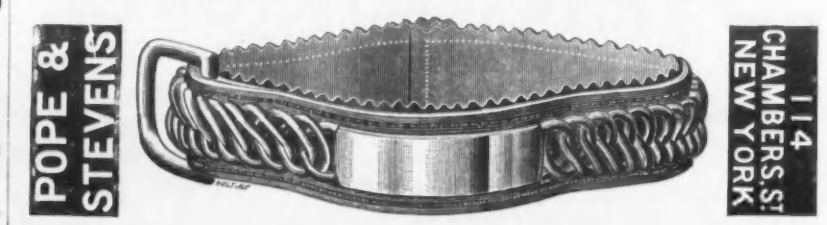
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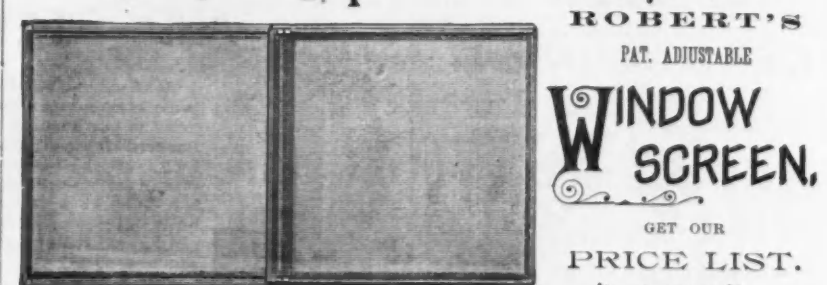
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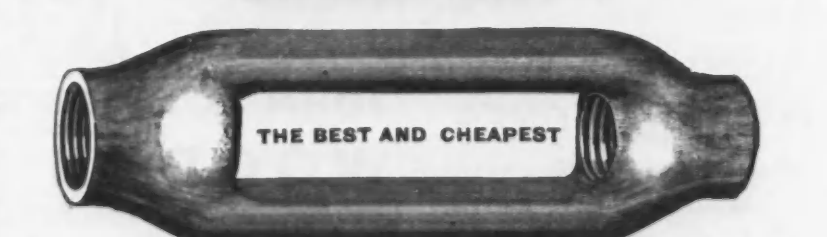
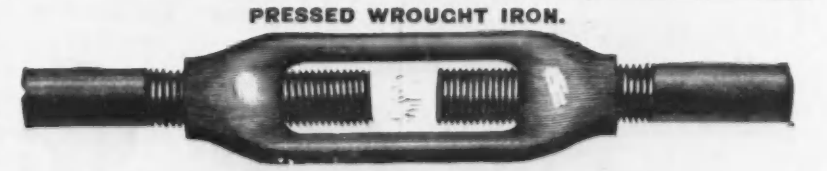
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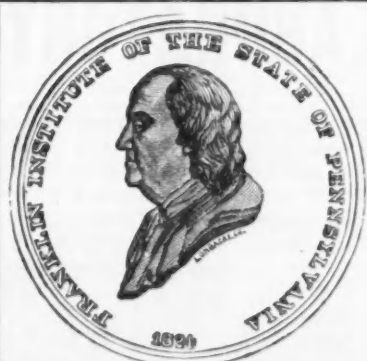
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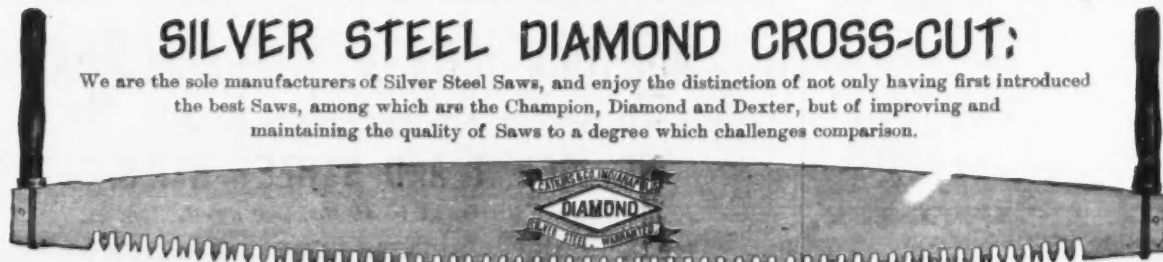
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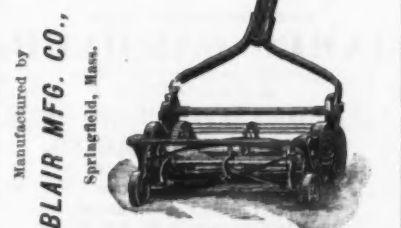



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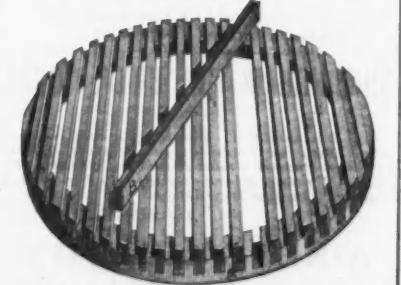
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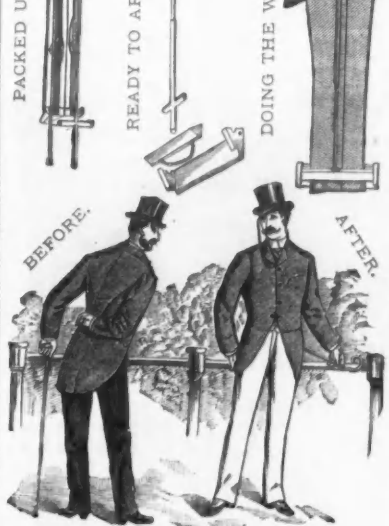


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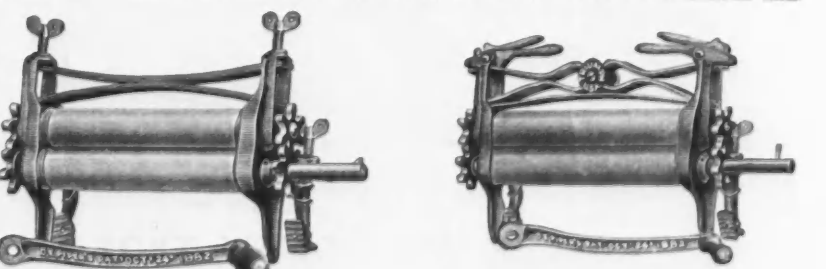


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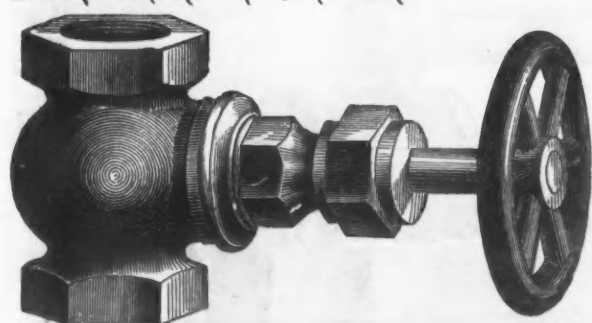








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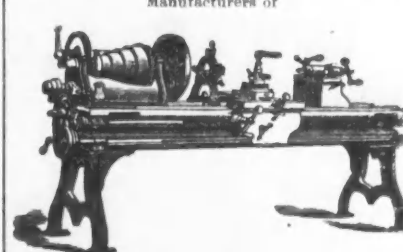
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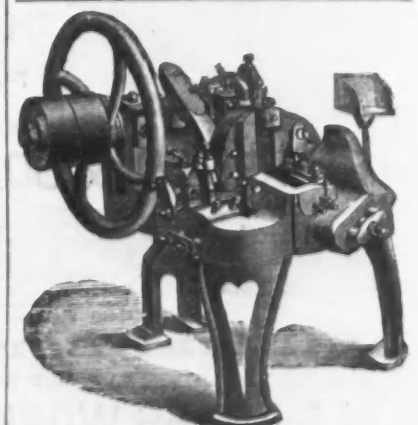
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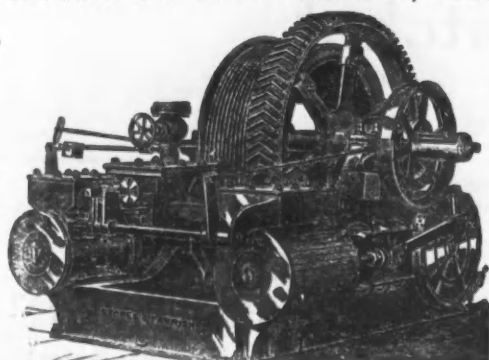
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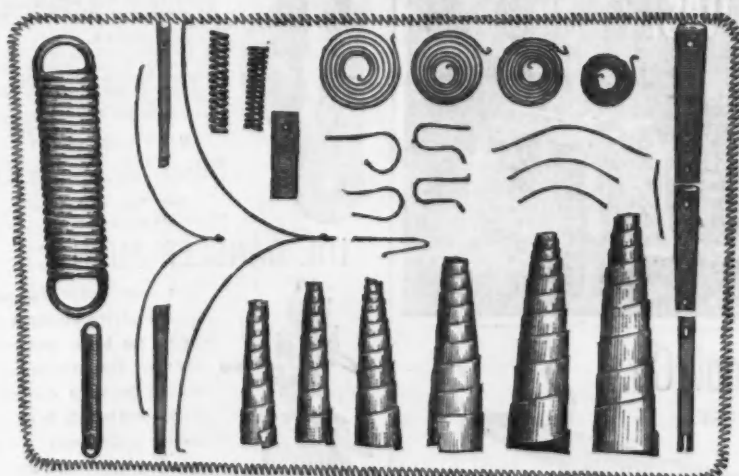
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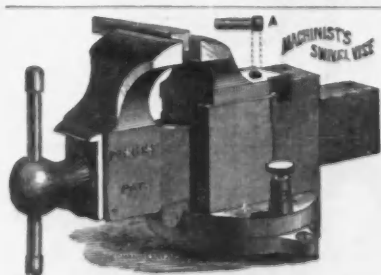
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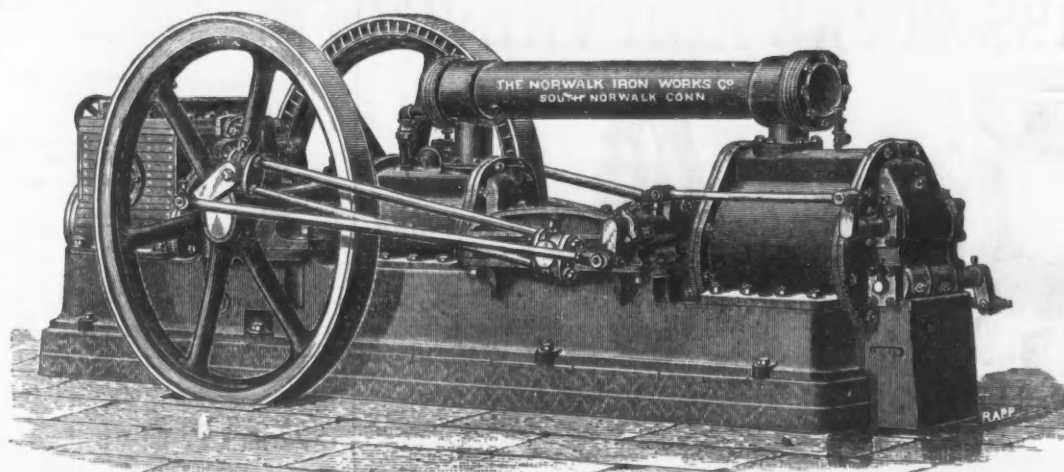
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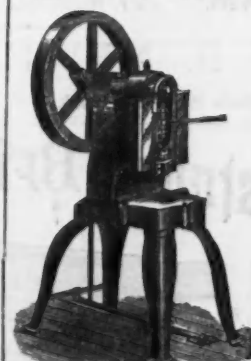
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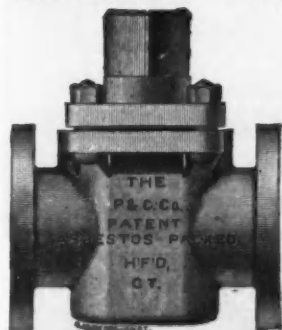
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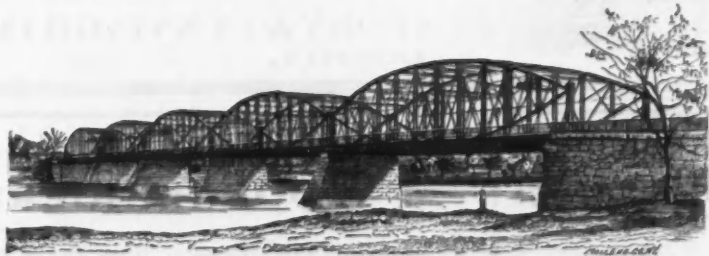
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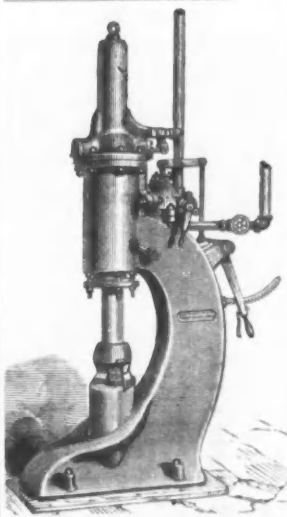
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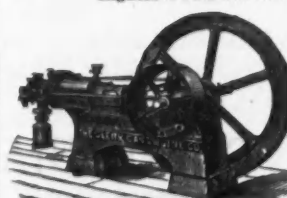
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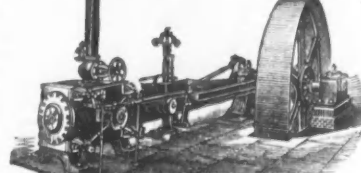
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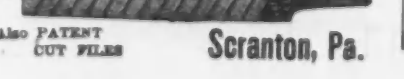
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